Crestron
Programming Design Kit

Instructions and Forms

CRESTRON

This document was prepared and written by the Marketing department at:

Crestron Electronics, Inc.
15 Volvo Drive
Rockleigh, NJ 07647
1-888-CRESTRON

All brand names, product names and trademarks are the property of their respective owners.
©2006 Crestron Electronics, Inc

Contents

PROGRAMMING DESIGN KIT **1**

Introduction **1**
Managing Expectations 1
Programming Software 2
Sound 2
Background Images 2

Touchpanel Templates and Themes **3**
Dashboard for Controls 5

Project Planning **6**
Additional Required Information 6
Form A – Device Data Instructions 6
FORM A – Device Data 7
Form B – Interface Specification Instructions 8
FORM B – Interface Specification 9
Form C – System Routing Specification Instructions 10
FORM C – System Routing 11
Form D – Touchpanel Specifications and Drawings 12
Form D – CT-1000 ColorTouch™ or LC-1000 BriteTouch® 3.8-inch Wall Mount Touchpanel 13
Form D – TPMC-10 Isys i/O™ WiFi Touchpanel 14
Form D – TPMC-15 Isys i/O™ WiFi Touchpanel Media Center 15
Form D – TPMC-15L Isys i/O™ WiFi Touchpanel Media Center 16
Form D – TPMC-17 Isys i/O™ WiFi Touchpanel Media Center 17
Form D – TPMC-17L Isys i/O™ WiFi Touchpanel Media Center 18
Form D – TPS-12 Isys® 12-inch Touchpanel 19
Form D – TPS12L Isys® 12-inch Touchpanel 20
Form D – TPS-15 Isys® 15-inch Touchpanel 21
Form D – TPS-15L Isys® 15-inch Touchpanel 22
Form D – TPS-17 Isys® 17-inch Touchpanel 23
Form D – TPS-17L Isys® 17-inch Touchpanel 24
Form D – TPS-1700 Isys® 6-inch Touchpanel 25
Form D – ST-1700C, STX-1700C, and STX-1700CXP (With Buttons) 26
Form D – ST-1700C, STX-1700C, and STX-1700CXP (Without Buttons) 27
Form D – TPS-2000L Isys® 5" Wall Mount Touchpanel 28
Form D – TPS-3000 Isys® 6.4-inch Touchpanel 29
Form D – TPS-3100L Isys® 6.4-inch Touchpanel 30
Form D – TPS-4000 Isys® 10.4-inch Touchpanel 31
Form D – TPS-4000L Isys® 10.4-inch Touchpanel 32
Form D – TPS-4500 Isys® 12-inchTilt Touchpanel 33
Form D – QM-FTCC-TPS4 QuickMedia FlipTop Touchpanel Computer Center and C2N-FT-TPS4 FlipTop Touchpanel Control Center 34
Form D – TPS-4L Isys® 4-inch Wall Mount Touchpanel 35
Form D – TPS-5000 Isys® 12-inch Touchpanel 36
Form D – TPS-6000 Isys® 15-inch Touchpanel 37
Form D – MT-1000 MiniTouch Handheld Wireless Touchpanel 38

Control System Block Diagrams **39**

Form E, Button Panel Specifications **40**
C2N-CB Series Cameo Keypads Description 40
Form E – C2N-CB Series Cameo Keypad Specification 41
Form E – C2N-DB6/8/12 Decorator Keypad Specifications 42
Form E – C2N-DBN12 & C2N-DBF12 Decorator Keypad Specifications 43
Form E – CNX-B2/B4/B6/B8/B12 Single Gang Keypads Specifications 44

Lighting Control Interface **45**
Converting Crestron Components to a User-Friendly Lighting Interface 45
Lighting Control Programming Request – Keypads 46
Lighting Control Programming Request – iLux 47
Lighting Control Programming Request – TPS-2000 Touchpanels 49

Appendix A: Touchpanel Objects **50**
Web Objects 56

Appendix B: Touchpanel Design Example **57**

Appendix C: Color Theory **62**
Light versus Paint 62
Color Properties 63
Color Perception 63
Color Harmony 64
Formulas for Color Harmony 64
Specifying Colors 67
Color Relativity and Readability 68

Further Inquiries **68**

INDEX **69**

Programming Design Kit

Introduction

Crestron connects people with technology. As products and systems become more complex, our touchpanels and keypads streamline and simplify technology so people can fully utilize and enjoy its advantages.

Crestron touchpanels and keypads provide an intuitive way for people to interact with and experience the systems in their homes, offices, schools and churches. Using touchpanels, individuals can create a comfortable environment, set a mood, and benefit from technology.

Managing Expectations

The key to designing a successful user interface is having a clear vision of the project, space, subsystems, the customer's desires and expectations — all of which dictate functionality.

It is vital that you know the functions to be controlled and have a clear vision from the end user regarding system use.

- Will the touchpanel interface with subsystems such as lighting, HVAC, and security?
- How does the customer want the zones divided and controlled for lighting, audio, and video?
- Does the customer expect complex lighting, water, and climate control events and scenarios, or do they just want to turn lights on and off?

It is equally important to evaluate the level of technical sophistication that the end user possesses. The programmer must work within the customer's abilities while striving to meet expectations. If the customer is pushed beyond their comfort zone, then the system will be unappealing to the client, resulting in disappointment and/or intimidation. Managing expectations is extremely important and knowing when and why to say "no" is critical to the success of any given project.

If there are too many buttons on a page then you should reorganize or reprioritize the subcategories to reduce the number of buttons per page.
The number of buttons that can comfortably be positioned on a screen is determined by the physical size of the touchpanel. Therefore, a more attractive, intuitive, easy-to-read and use interface is achieved with a larger touchscreen. The ideal number of button presses to affect an event from anywhere in the GUI is one to three. Reducing

navigation, button presses, and subpages for the end user makes the interface more useful and attractive.

When designing a custom interface, start by talking to the customer about the décor of the room, corporate image, or favorite colors. It is essential to understand how the interface is intended to complement or match the client's décor and environment.

Programming Software

VisionTools Pro-e (or VT Pro-e) is the Crestron Windows-based software for designing the page layouts and functionality of user interfaces. Controls are grouped together on "pages" and these control pages are organized and grouped together as a project.

A typical page layout includes objects such as buttons and sliders that start actions and provide feedback to the end user. Pages can also include video windows, decorative graphics, background graphics, text and a variety of other objects.

A "page flip" causes the screen to switch from one page to another when a button is pressed. Browser projects also support page flips to a URL, or even to a different section of the current (large) page.

Subpages are similar in many ways to standard pages, in that they may contain buttons, text, graphics, etc. However, subpages ordinarily do not take up the entire display area. Instead, a subpage often defines a small area with buttons serving a specific function, such as VCR control. A subpage can be designed to appear on top of a standard page at any time and then disappear when no longer needed.

VisionTools Pro-e software enables you to layer objects on top of each other, allowing for versatile design possibilities. Objects are layered in the order they are created. That is, a newly created object will be overlaid onto an existing one, and if one object is dragged over to another, the more recently created object will be visible on top. Refer to Appendix B, on page 57, for an example program.

Sound

The Vision Tools Pro-e Sound Manager enables you to add WAV files to projects for sound-enabled touchpanels and keypads, such as the LC-1000, CT-1000, most TPS panels, and CNX-B2/B4/B6/B8/B12 button panels.

Background Images

VisionTools Pro-e supports BMP, PCX, DIB, and JPEG formats. Images can be modified to fit the page. The *Tile* option fills the space on the page with multiple copies of the image (This feature works best with smaller images). The *Stretch to Fit* option stretches out the image to fill the entire page.

Touchpanel Templates and Themes

Crestron offers a variety of pre-designed templates that are totally customizable to fit your needs. The templates cover a wide variety of control requirements and provide the designer with a starting point for large or small projects. The following are a few examples of the many possibilities that templates can provide. Refer to http://www.crestron.com/tools_and_resources/programming_and_integration_resources/gui_solutions/#crestron for additional template examples and icons.

In the VisionTools Pro-e software, a theme is a set of unified design elements and color schemes for the objects and pages in your touchpanel project. When you apply a theme to a project, VisionTools Pro-e customizes attributes, such as colors, styles, fonts and shapes, for elements in the project. In this way a theme helps you easily create a consistent and professional look.

With the Crestron Theme Library, you can have themes that are designed for particular applications, such as Residential, Commercial, or Educational. You can also categorize themes according to general style, such as Traditional, Modern, Industrial, or Classic.

Crestron provides several themes that are available on your hard drive when you install VisionTools Pro-e. Using the Theme Library, you can view or customize the Crestron themes, design your own themes, and edit or delete themes.

The Theme Library organizes themes by touchpanel type; all themes are available to any project of the same type, including projects created in earlier versions of VisionTools Pro-e. The Readme document contains a list of recommended fonts for use with VT Pro-e Themes. Many of the fonts listed are included with Windows operating systems.

Examples of Touchpanel Templates and Themes

Refer to: www.crestron.com>Tools & Resources > Programming and Integration Resources > **GUI Solutions**

Dashboard for Controls

The basic premise of the “Dashboard for Controls” document is that operation of a professionally installed A/V presentation system should be as easy to operate as driving a car. Standardization on some basics of user interface design and identification of fundamental A/V system functions will increase confidence that frequently used functions will "look and feel" like others previously used.

These dashboard publications published by InfoComm are designed to guide the creation of pro-A/V touchpanel controls to promote intuitive end user operation of professionally installed A/V systems.

- Dashboard for Controls Design Guide: A Guide for the Creation of Touch Panel Control Interfaces
- Dashboard for Controls Design Reference: A Companion to the Design Guide

These guides can be downloaded from:

http://www.infocomm.org/dashboard

Project Planning

Planning your project carefully will produce good results. This involves providing complete information on the required forms. This kit contains forms that you will fill in to define your project.

- Form A is a complete **list of all equipment** to be controlled (refer to page 6).
- Form B defines your **customer interface** (refer to page 8).
- Form C defines the routing of **source to destination** (refer to page 10).
- Form D contains **model specific information**, provides a sketch area for each particular touchpanel, and permits you to specify engraving where applicable (refer to page 12).
- Form E provides a method to specify **button panel operation** and engraving (refer to page 40).
- Additional forms are provided for **lighting control** (refer to page 45).

Additional Required Information

A successful design requires complete information. Please submit the following documents, if available.

- A System Block Diagram (refer to page 39 for an example)
- Control Diagrams
- Facility Plans and/or Other Layout Diagrams
- A System Description
- Applicable Audio Files
- Applicable Graphic Files (BMP, DIB, JPG or PCX)

Form A – Device Data Instructions

The initial task is data collection. Each device to be controlled must be listed according to type, manufacturer, model number, and control method (RS-232, IR, etc.).

For equipment that does not have discreet power on/off capability, you can specify additional video or current sensing equipment.

Crestron maintains an extensive database of equipment control software, making it very likely that we have information on every piece of equipment in your project. Use as many copies of **Form A** to collect and record this data as necessary. Be sure to fill in the heading on every copy.

FORM A – Device Data

Project Name	Date
Order/Quote #	Page of

Type of Device (TV, VCR, CD, etc.)	Manufacturer (Sony, Panasonic, etc.)	Model Number (ex: AG-1350)	Control Method (RS-232, IR, etc.)	Additional Current/Video Sensors (ST-VS, ST-CS, etc.)

Form B – Interface Specification Instructions

Determine the number of pages required for your project. Assuming at least one page for each device (Projectors, Plasma display, CD, VCR, etc.), plus pages for systems (HVAC, Security, etc.), plus the Main page. Then print at least an equal number of copies of Form B. Pages and subpages are unique and should not share forms.

Fill in the Project Name, Date, Touchpanel Model Number (ex., TPS-4000), the Screen Name (ex., Main Page) and Location (ex., Home Theater Room), Order/Quote #, and number the page (ex., 1 of 7), on every page.

FORM B – Interface Specification

Project Name	Date
Order/Quote #	Page of
Touchpanel Model #	Screen Name and Location

Object Type (Button, Slider, Gauge, etc.)	**Object Label** (Abbreviate as necessary)	**Function/Device** (Specify the function to control and the device to control)	**Page Flip To…** (Subpage Name, Main Page, etc.)	**Color** (RGB, Hue, Saturation, Luminance)

Form C – System Routing Specification Instructions

Form C is used to describe the routing of each source output to each destination input. Specify the source (DVD-1, VCR-2, Laptop, etc.) and the particular source output (Video-1, S-Video-2, Component Video, etc.).

When an intermediate switcher is used, specify the device and the input/output ports (Video 1 IN/Video 1 OUT, etc.).

The final destination device is noted in the last column, include the device name and the input port.

The bottom of the form has an area for additional notes that can be used to further define how the system can be programmed for your specific needs.

Make as many copies of Form C as necessary.

FORM C – System Routing

Project Name	Date
Order/Quote #	Page of

Source Name	Source Output/Type	Switcher Device Name		Final Destination And Input Port
		Input Port	Output Port	

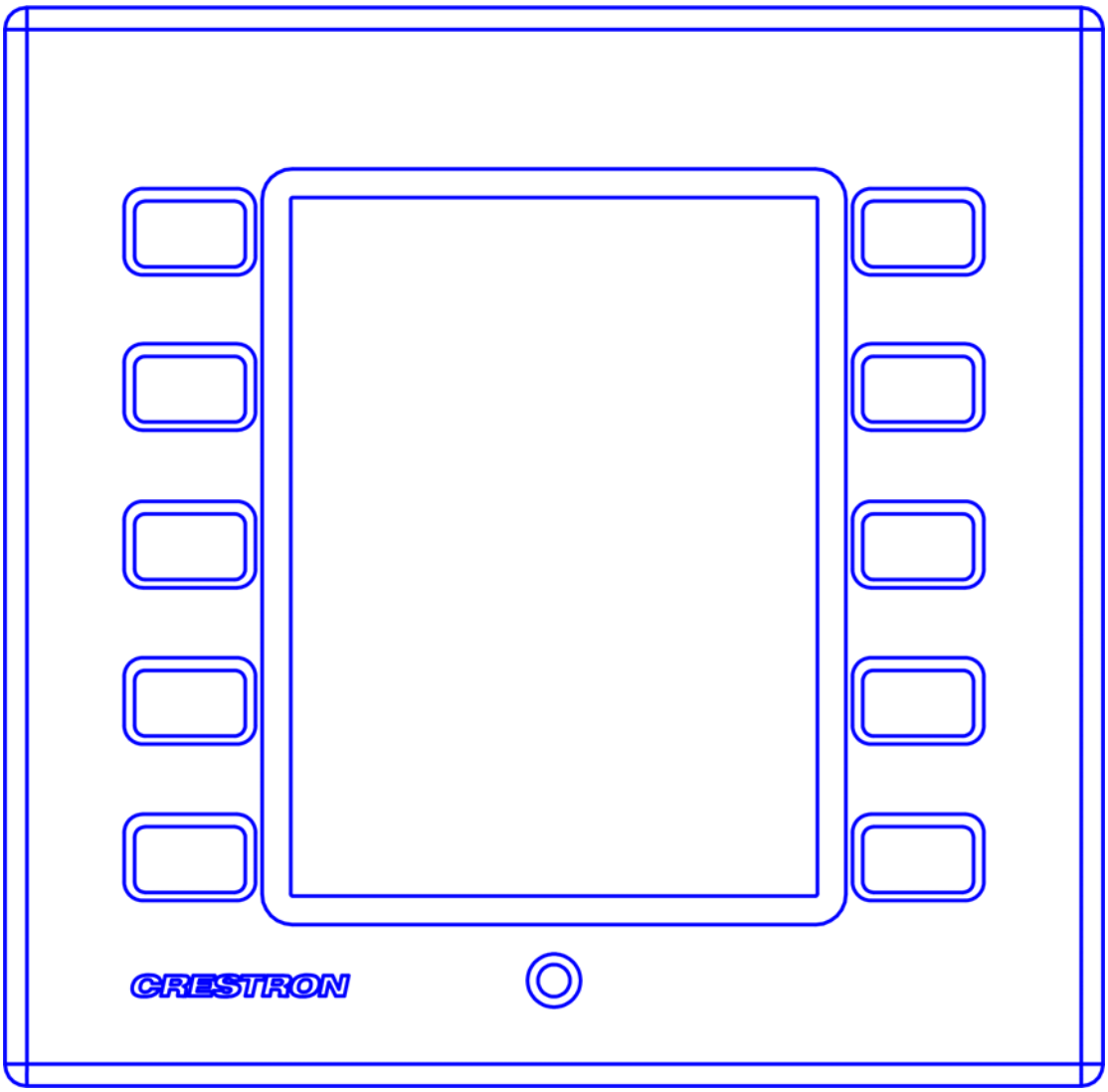
Form D – Touchpanel Specifications and Drawings

These pages contain the touchpanel specifications that will directly affect your design.

In addition, you can use the proportionately scaled drawings to make a sketch of your project, write engraving instructions (where applicable), and include any additional notes. Make as many copies of these pages as necessary. Be sure to number the forms carefully.

Form D – CT-1000 ColorTouch™ or LC-1000 BriteTouch® 3.8-inch Wall Mount Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

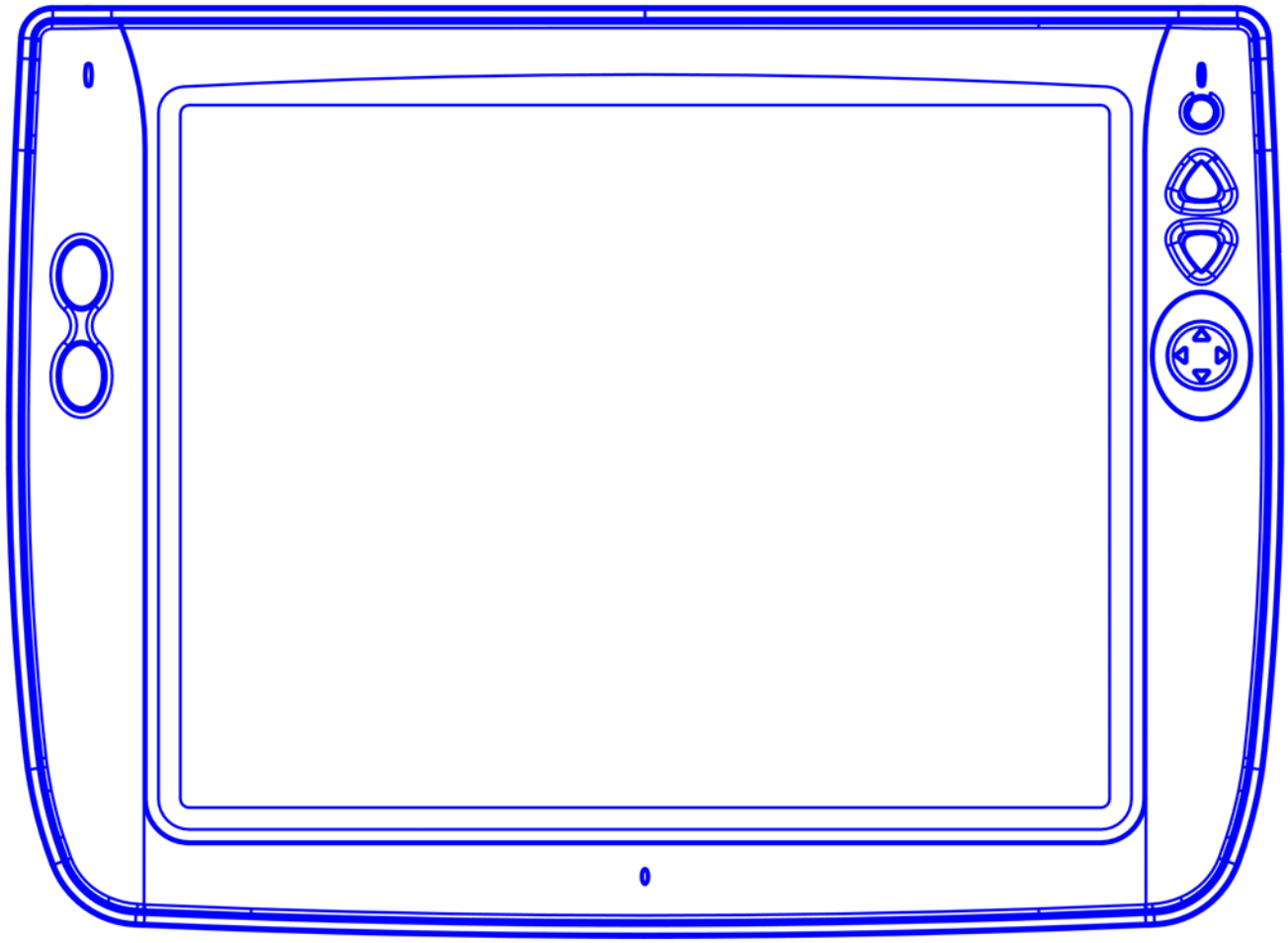


NOTE: Scale drawing not actual size.

Screen Size	3.8 inch (9.6 cm) diagonal
Aspect Ratio	4:3
Resolution	240 x 320 pixels
Graphic Capability	ColorTouch, 4,096 colors, 256 color palette BriteTouch, four shades of grayscale
Audio	WAV: PCM, 8KHz, mono, 8-bit. ~90 seconds capacity
Optional Buttons	(10) 1000/2000-BTN Engravable Button Cap

Form D – TPMC-10 Isys i/O™ WiFi Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

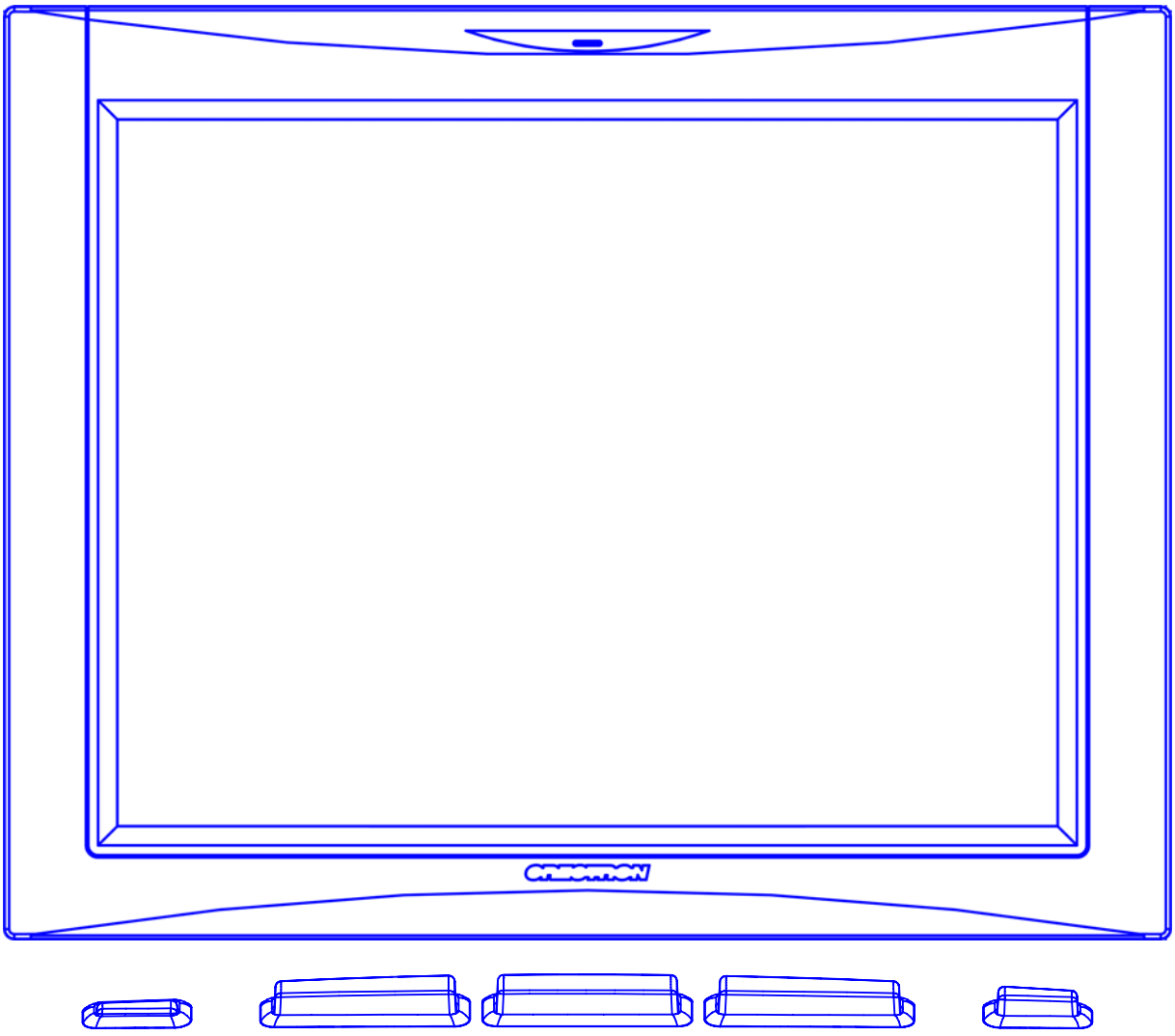


NOTE: Scale drawing not actual size.

Screen Size	10.4 in (26.4 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	800 x 600 pixels
Graphic Capability	16-bit 65,536 colors
Audio	WAV, MP3 and 8-bit/16-bit PCM Mono and Stereo

Form D – TPMC-15 Isys i/O™ WiFi Touchpanel Media Center

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



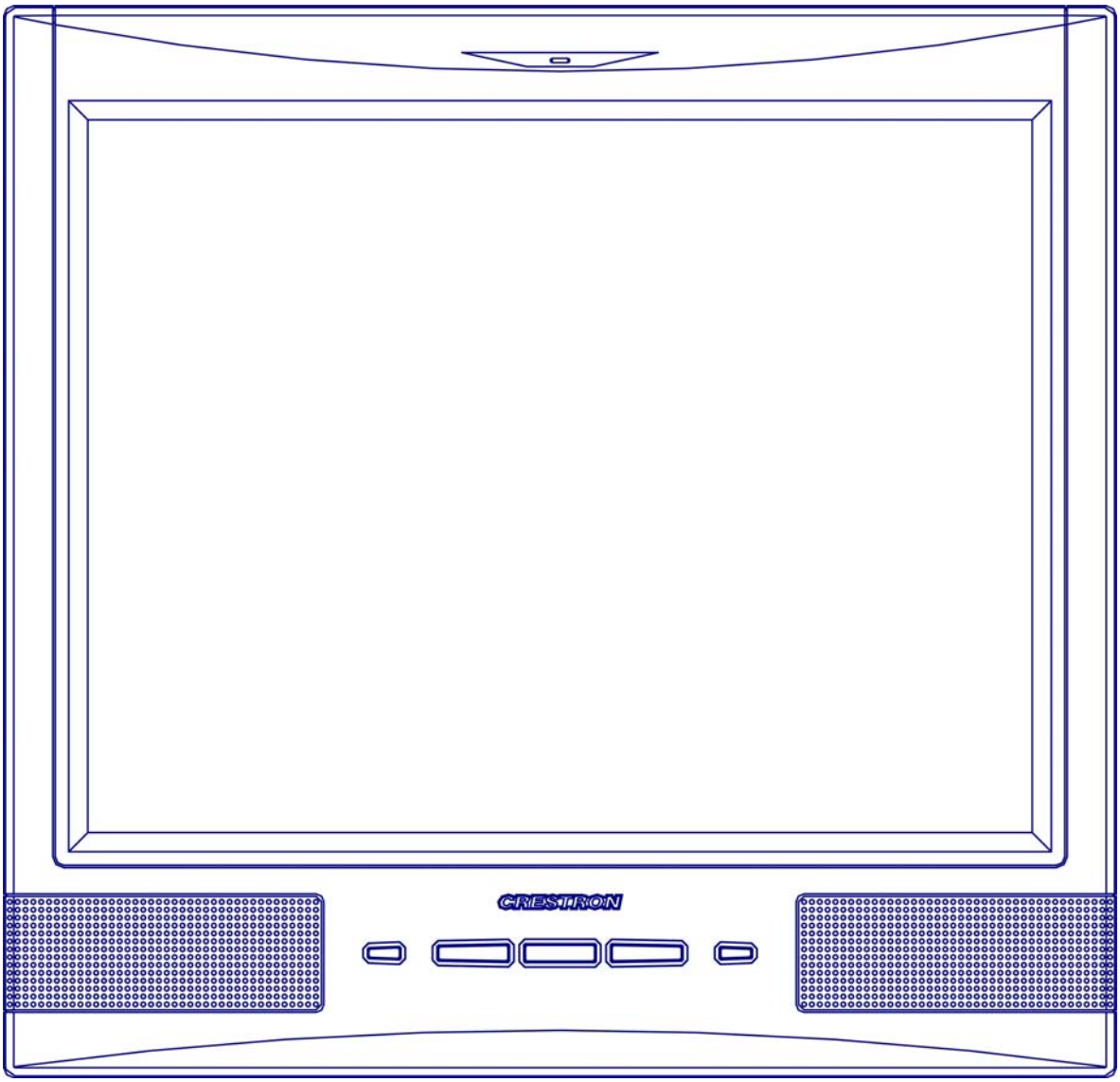
Hard Buttons

NOTE: Scale drawing not actual size.

Screen Size	15 inch (38.1 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	1024 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	MP3, WAV, WAX, WMA (via Windows Media Player) WAV 8 & 16 bit PCM, mono & stereo

Form D – TPMC-15L Isys i/O™ WiFi Touchpanel Media Center

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

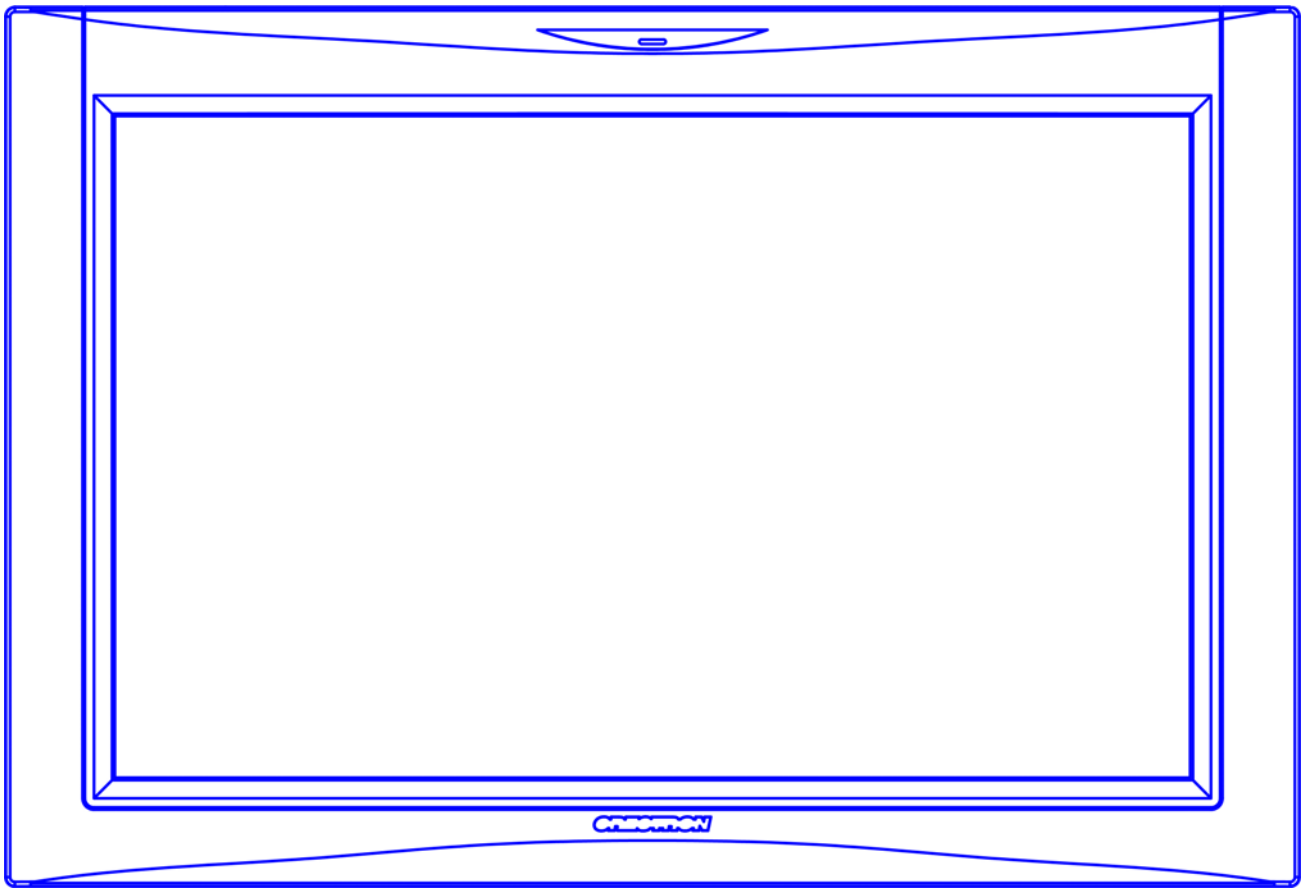


NOTE: Scale drawing not actual size.

Screen Size	15 inch (38.1 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	1024 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	MP3, WAV, WAX, WMA (via Windows Media Player) WAV 8 & 16 bit PCM, mono & stereo

Form D – TPMC-17 Isys i/O™ WiFi Touchpanel Media Center

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



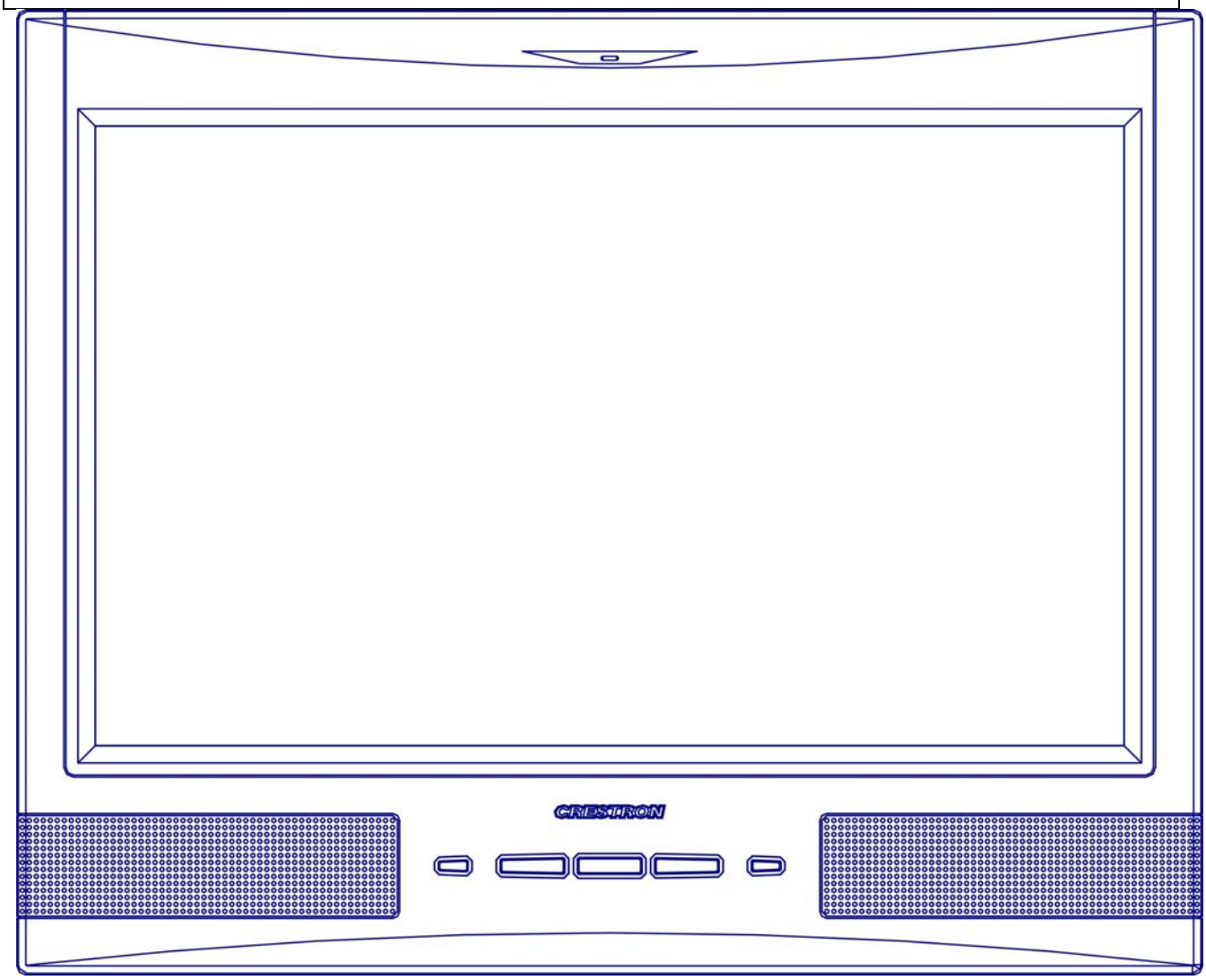
Hard Buttons

NOTE: Scale drawing not actual size.

Screen Size	17 inch (43.2 cm) diagonal
Aspect Ratio	15:9 WXGA
Resolution	1280 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	MP3, WAV, WAX, WMA (via Windows Media Player) WAV 8 & 16 bit PCM, mono & stereo

Form D – TPMC-17L Isys i/O™ WiFi Touchpanel Media Center

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

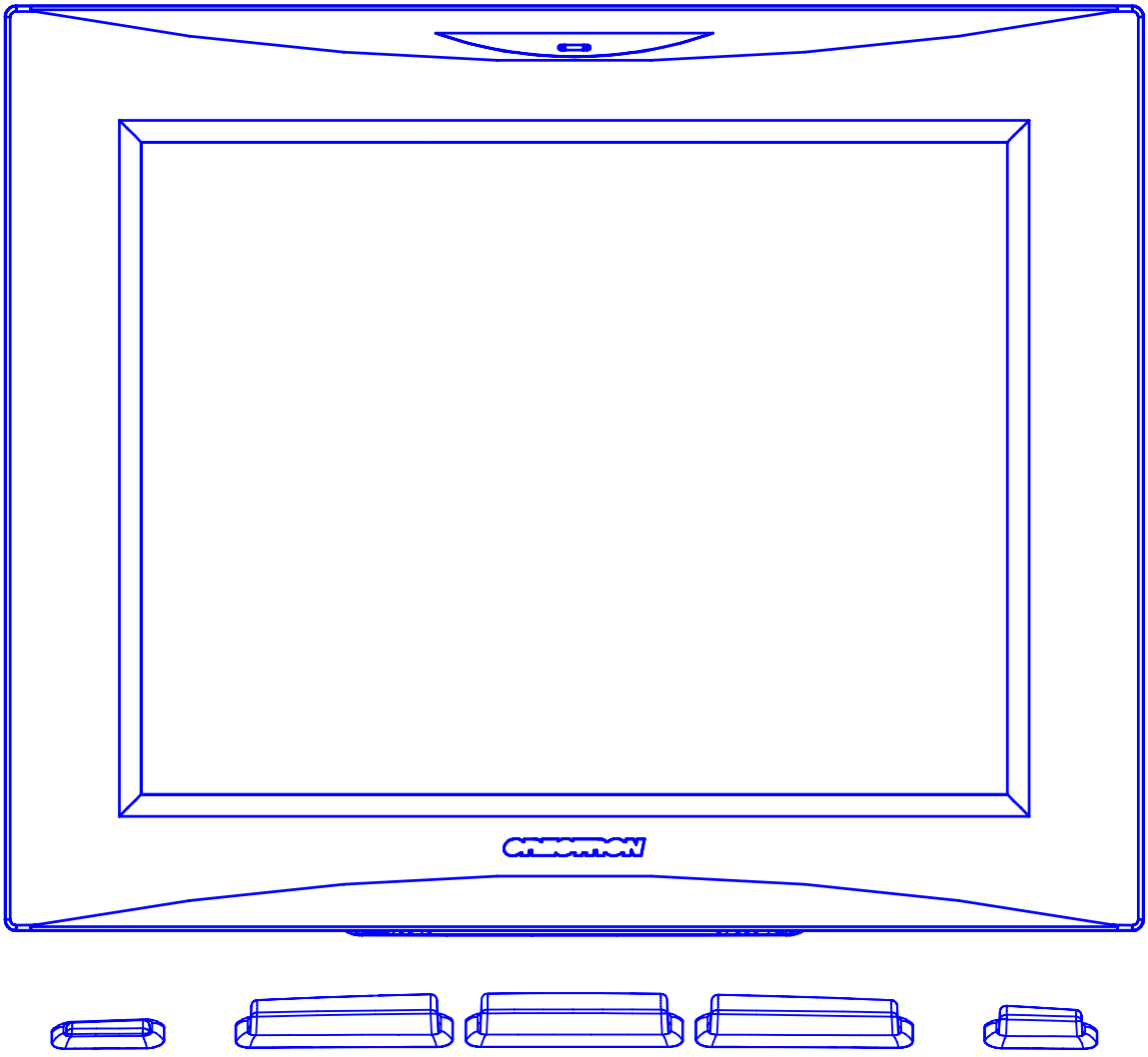


NOTE: Scale drawing not actual size.

Screen Size	17 inch (43.2 cm) diagonal
Aspect Ratio	15:9 WXGA
Resolution	1280 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	MP3, WAV, WAX, WMA (via Windows Media Player) WAV 8 & 16 bit PCM, mono & stereo

Form D – TPS-12 Isys® 12-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



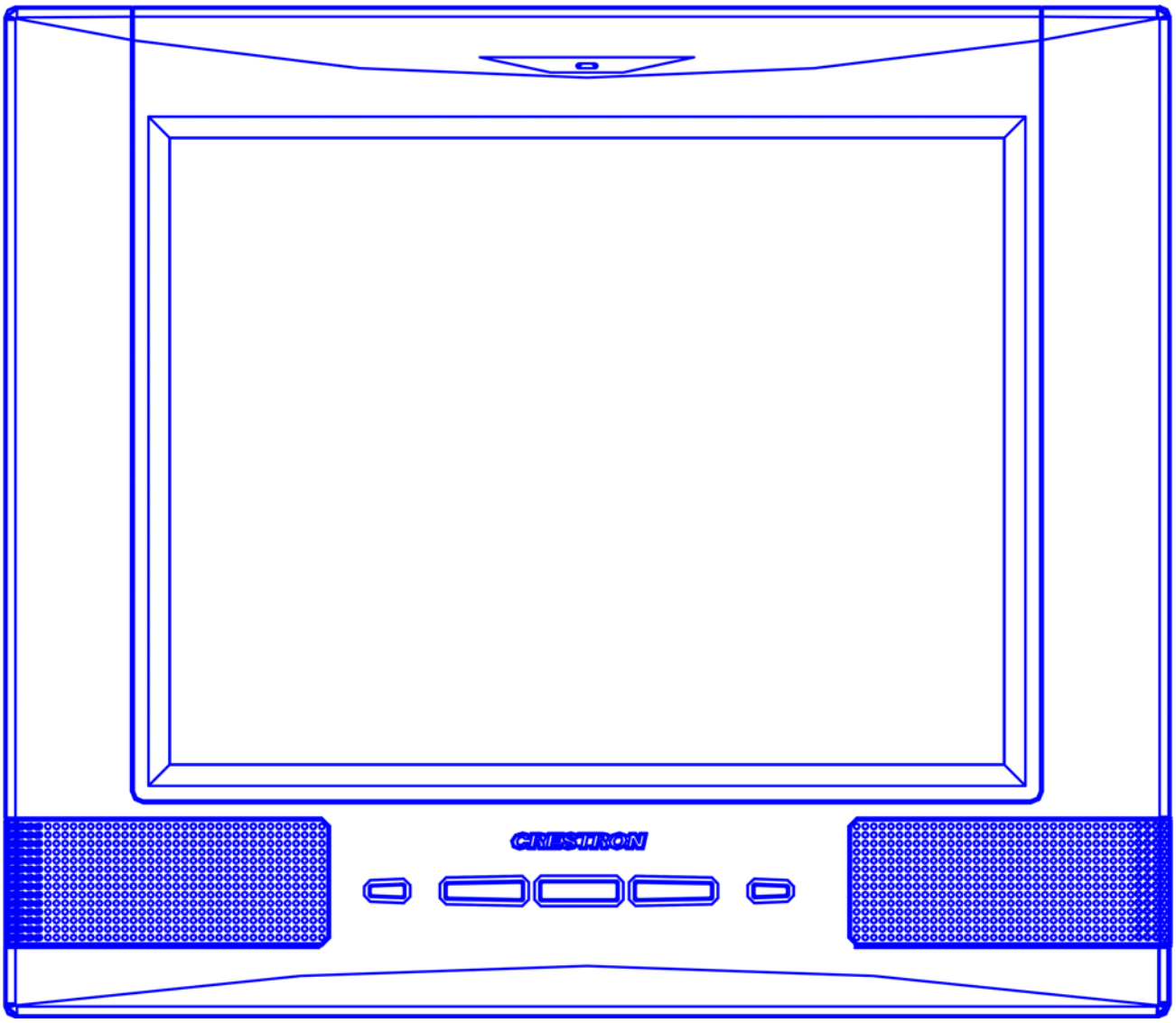
Hard Buttons

NOTE: Scale drawing not actual size.

Screen Size	12 inch (30.5 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	800 x 600 pixels
Graphic Capability	24-bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	8-bit PCM, mono

Form D – TPS12L Isys® 12-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

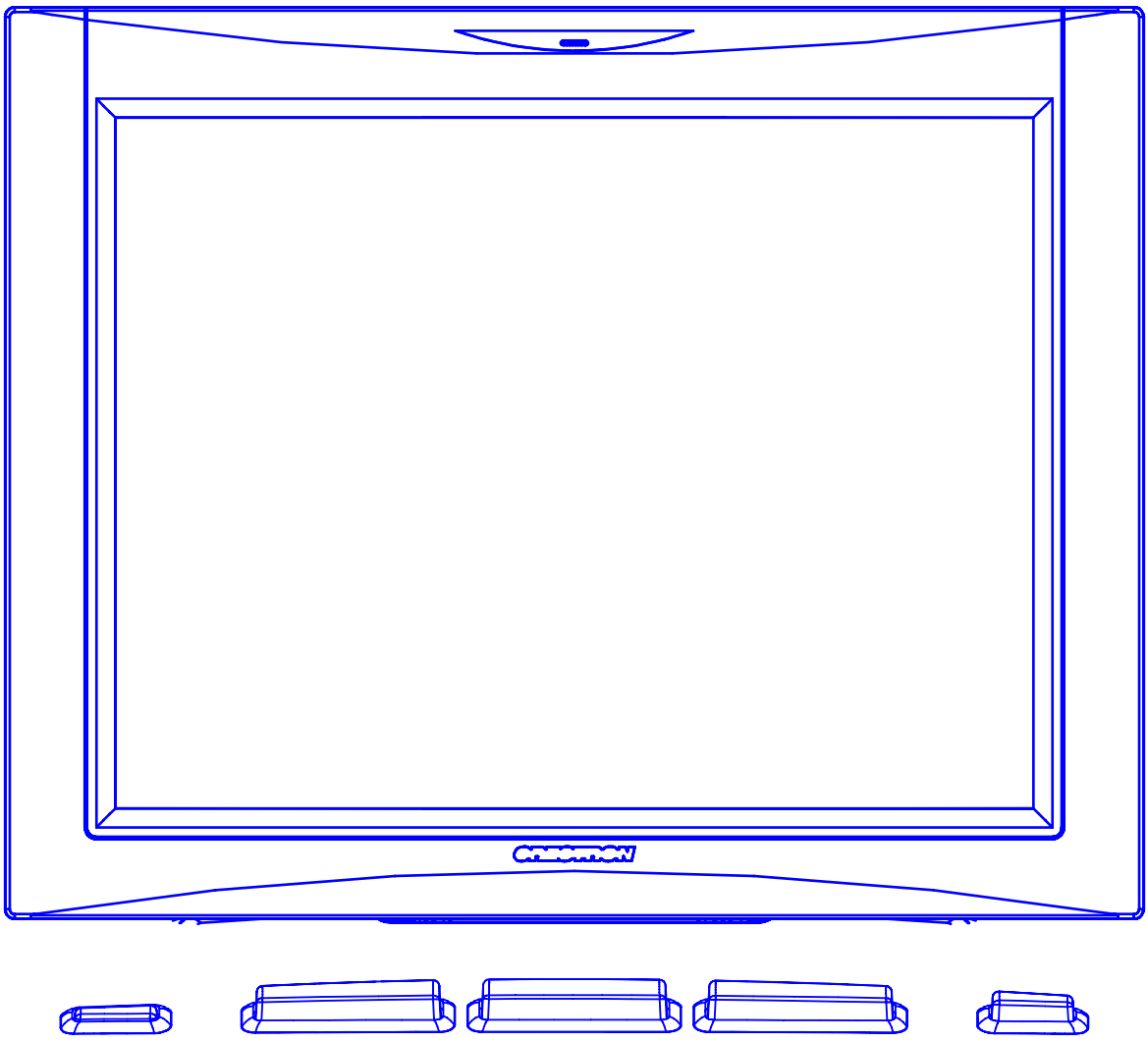


NOTE: Scale drawing not actual size.

Screen Size	12 inch (30.5 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	800 x 600 pixels
Graphic Capability	24-bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	8-bit PCM, mono

Form D – TPS-15 Isys® 15-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



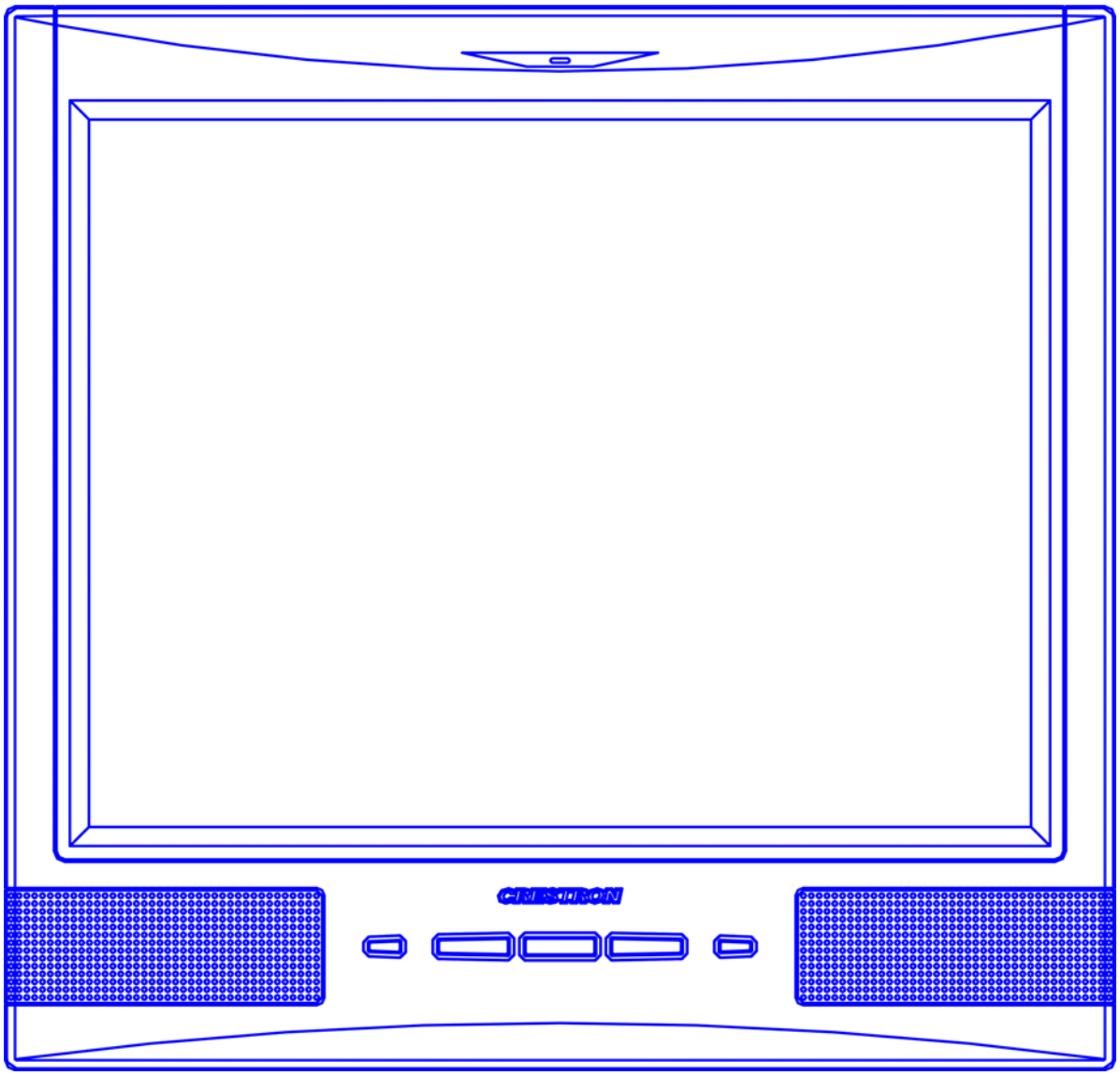
Hard Buttons

NOTE: Scale drawing not actual size.

Screen Size	15 inch (38.1 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	1024 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	WAV, 8-bit PCM, mono

Form D – TPS-15L Isys® 15-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

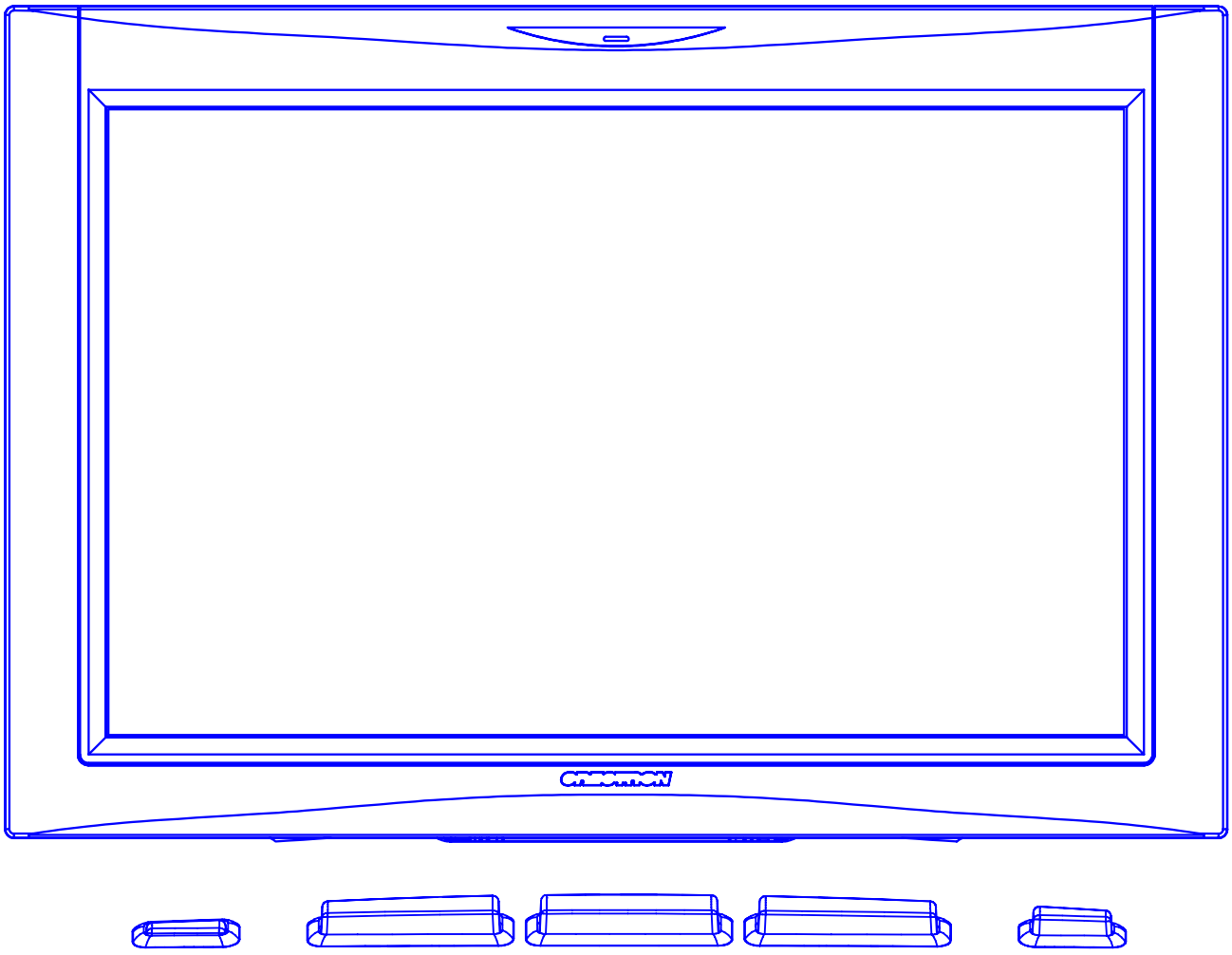


NOTE: Scale drawing not actual size.

Screen Size	15 inch (38.1 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	1024 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	WAV, 8-bit PCM, mono

Form D – TPS-17 Isys® 17-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



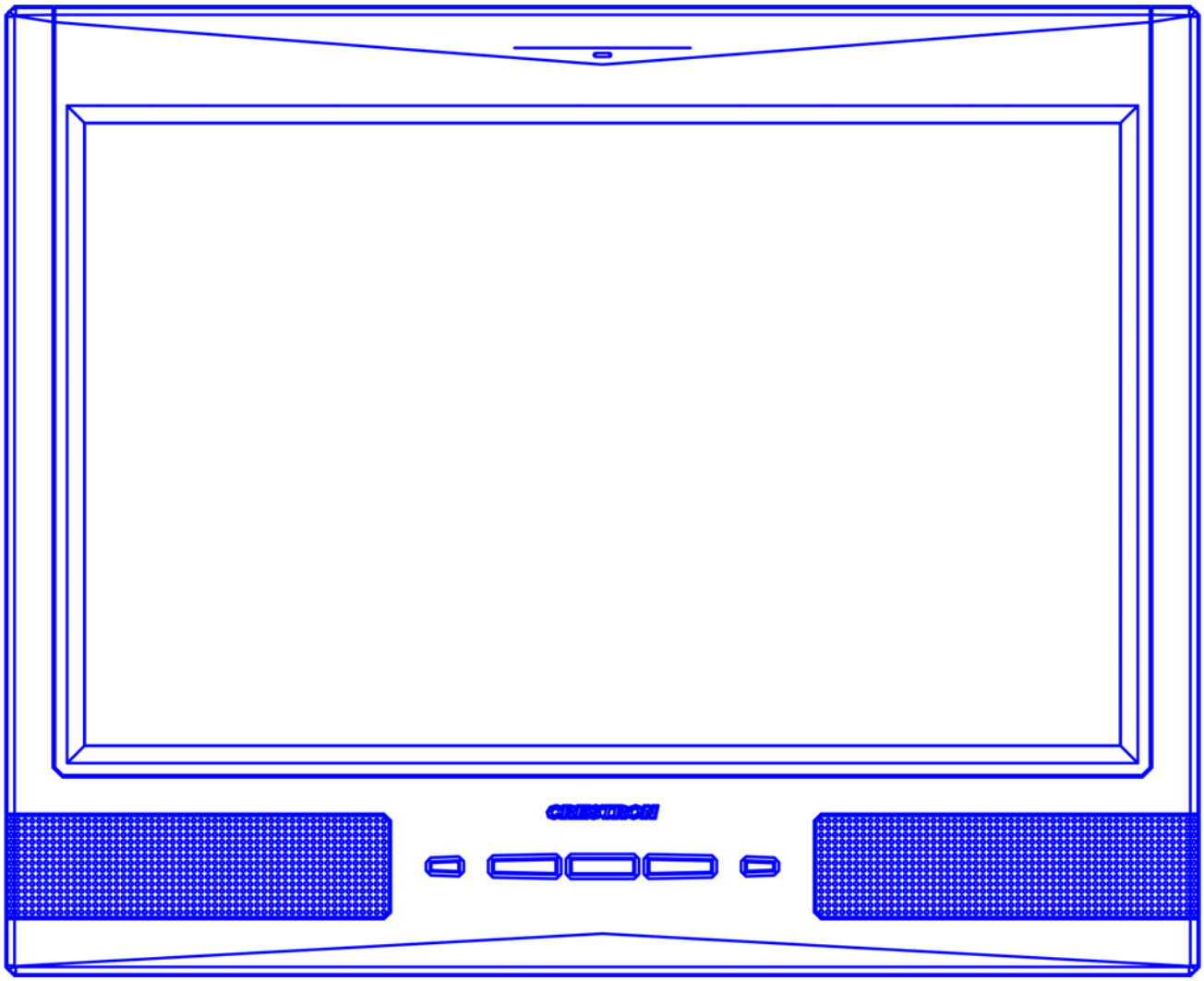
Hard Buttons

NOTE: Scale drawing not actual size.

Screen Size	17 inch (43.2 cm) diagonal
Aspect Ratio	15:9 WXGA
Resolution	1280 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	WAV, 8-bit PCM, mono

Form D – TPS-17L Isys® 17-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

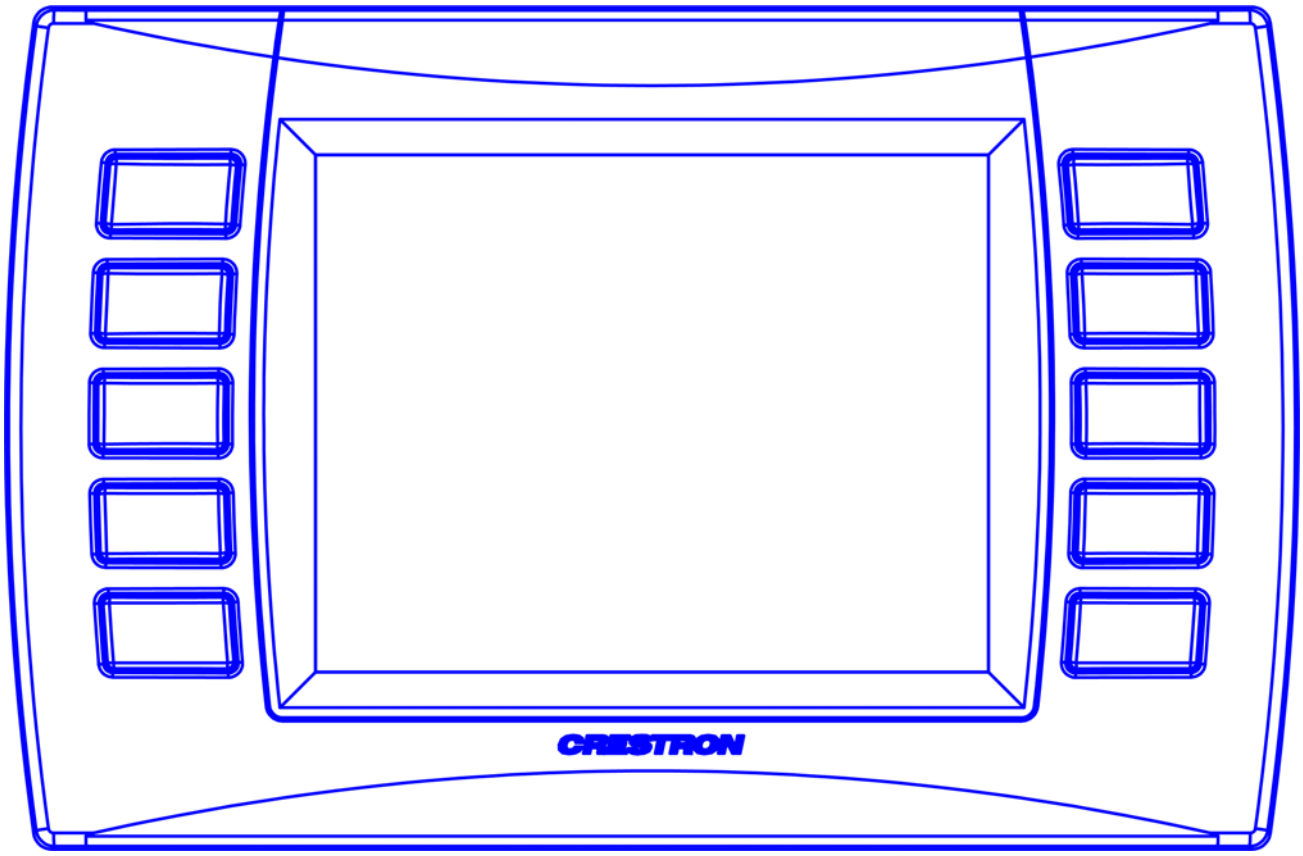


NOTE: Scale drawing not actual size.

Screen Size	17 inch (43.2 cm) diagonal
Aspect Ratio	15:9 WXGA
Resolution	1280 x 768 pixels
Graphic Capability	24 Bit non-palette graphics + 8 Bit alpha channel, 16.7 million colors
Audio	WAV, 8-bit PCM, mono

Form D – TPS-1700 Isys® 6-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

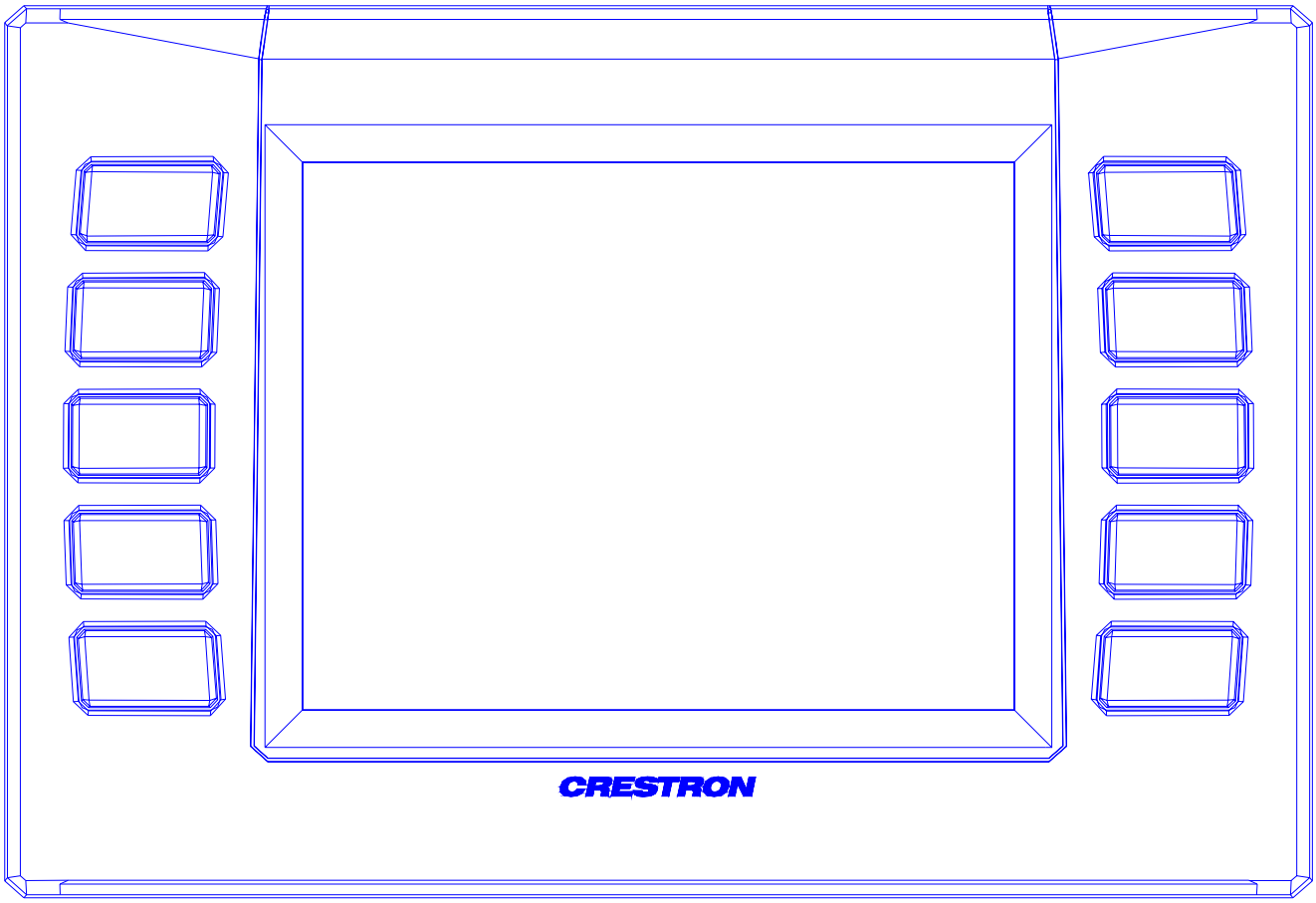


NOTE: Scale drawing not actual size.

Screen Size	5.7" (14.4cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	320 x 240 pixels
Graphic Capability	16 Bit non-palette graphics, 64,000 colors
Audio	None
Optional Buttons	(10) Engraved buttons and bezel kit (1700C-BTNB-BEZEL)

Form D – ST-1700C, STX-1700C, and STX-1700CXP (With Buttons)

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

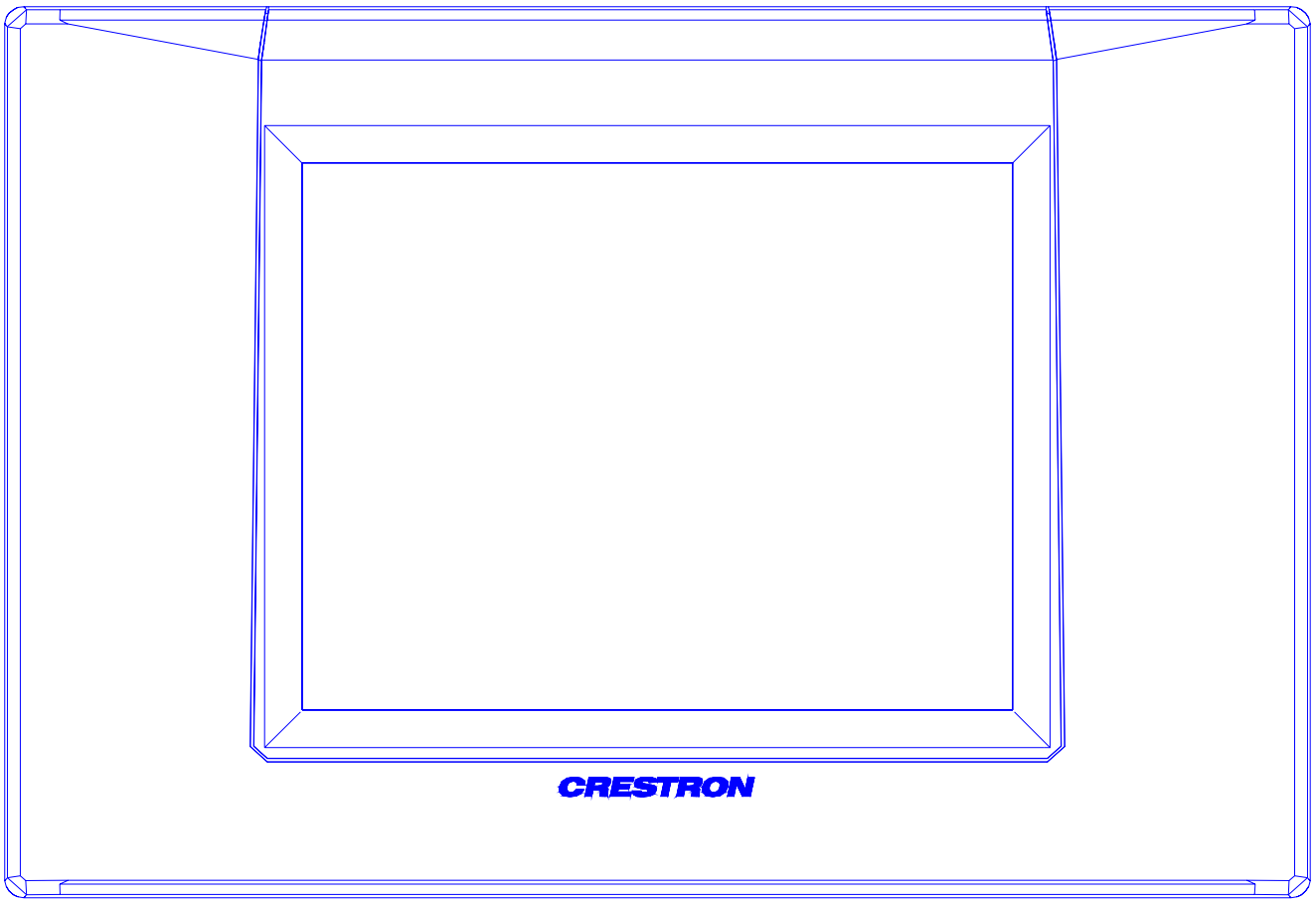


NOTE: Scale drawing, not actual size.

Screen Size	5.7" (14.4cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	320 x 240 pixels
Graphic Capability	16 Bit non-palette graphics, 64,000 colors
Audio	None
Optional Buttons	(10) Engraved buttons and bezel kit (1700C-BTNB-BEZEL)

Form D – ST-1700C, STX-1700C, and STX-1700CXP (Without Buttons)

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

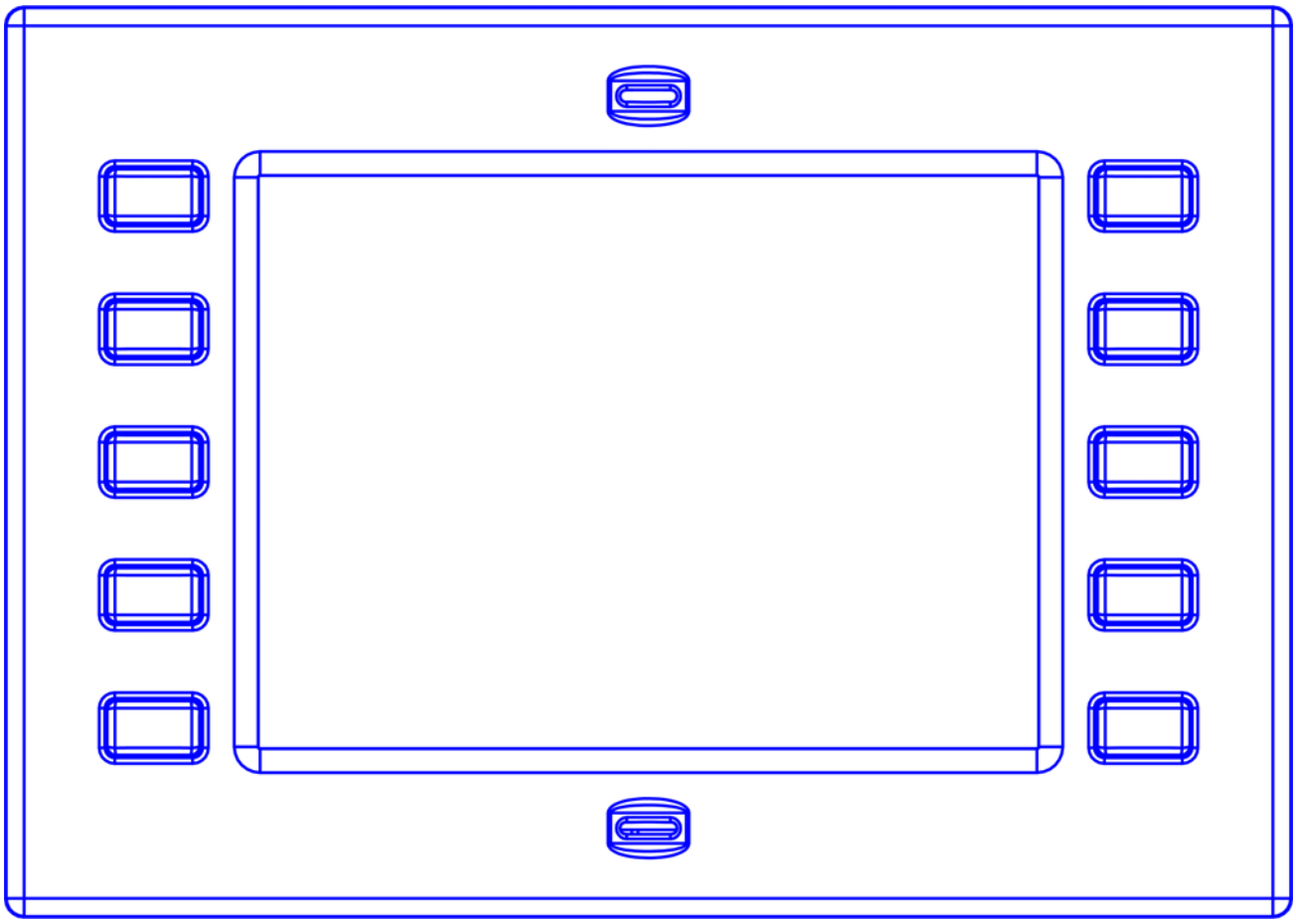


NOTE: Scale drawing, not actual size.

Screen Size	5.7" (14.4cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	320 x 240 pixels
Graphic Capability	16 Bit non-palette graphics, 64,000 colors
Audio	None
Optional Buttons	None

Form D – TPS-2000L Isys® 5" Wall Mount Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

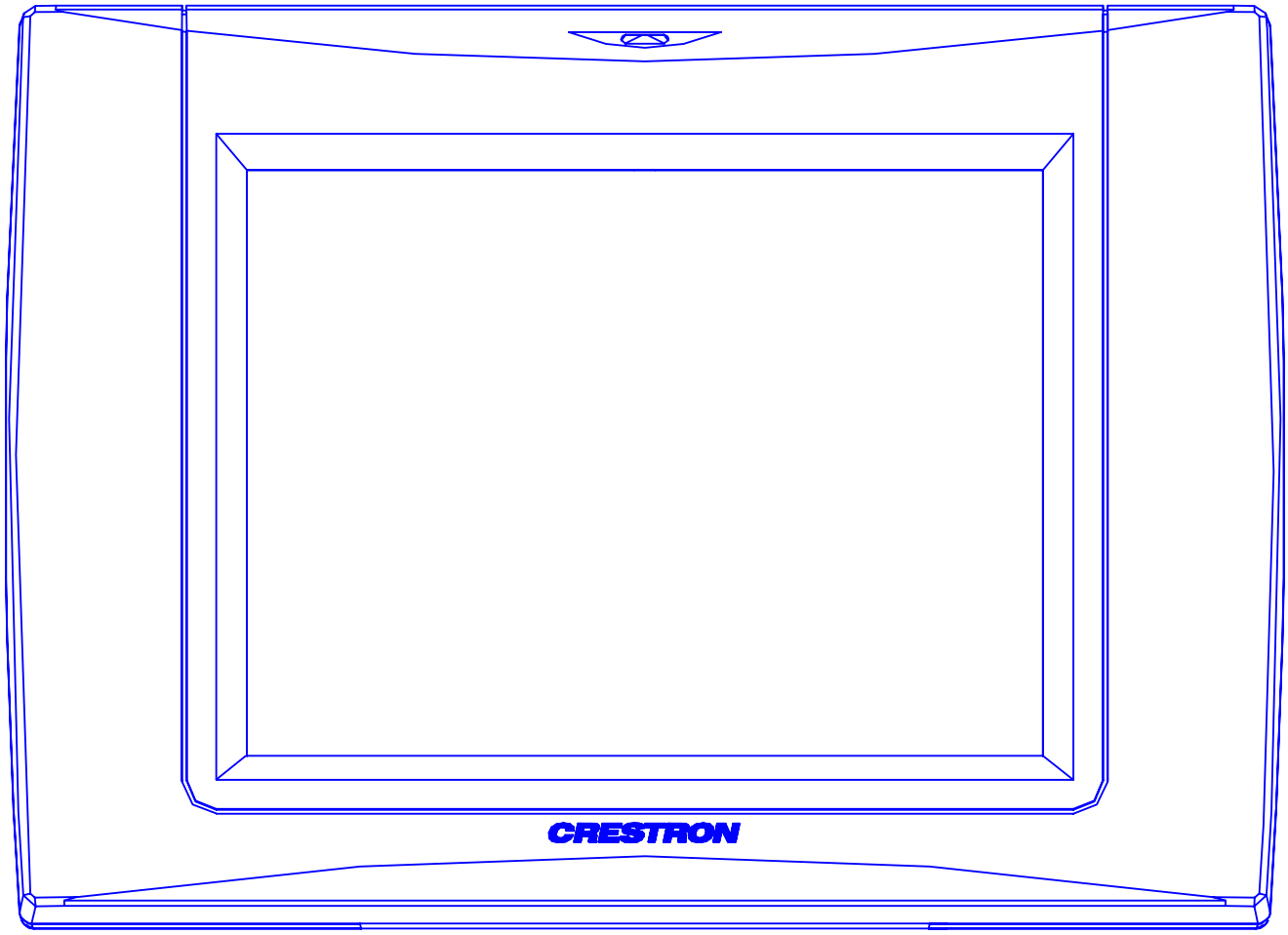


NOTE: Scale drawing not actual size.

Screen Size	5 inch (12.7 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	320 x 234 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	8-bit PCM, mono, 8 kHz sampling rate, ~3 minutes capacity
Optional Buttons	(10) 1000/2000-BTN Engravable Button Cap

Form D – TPS-3000 Isys® 6.4-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

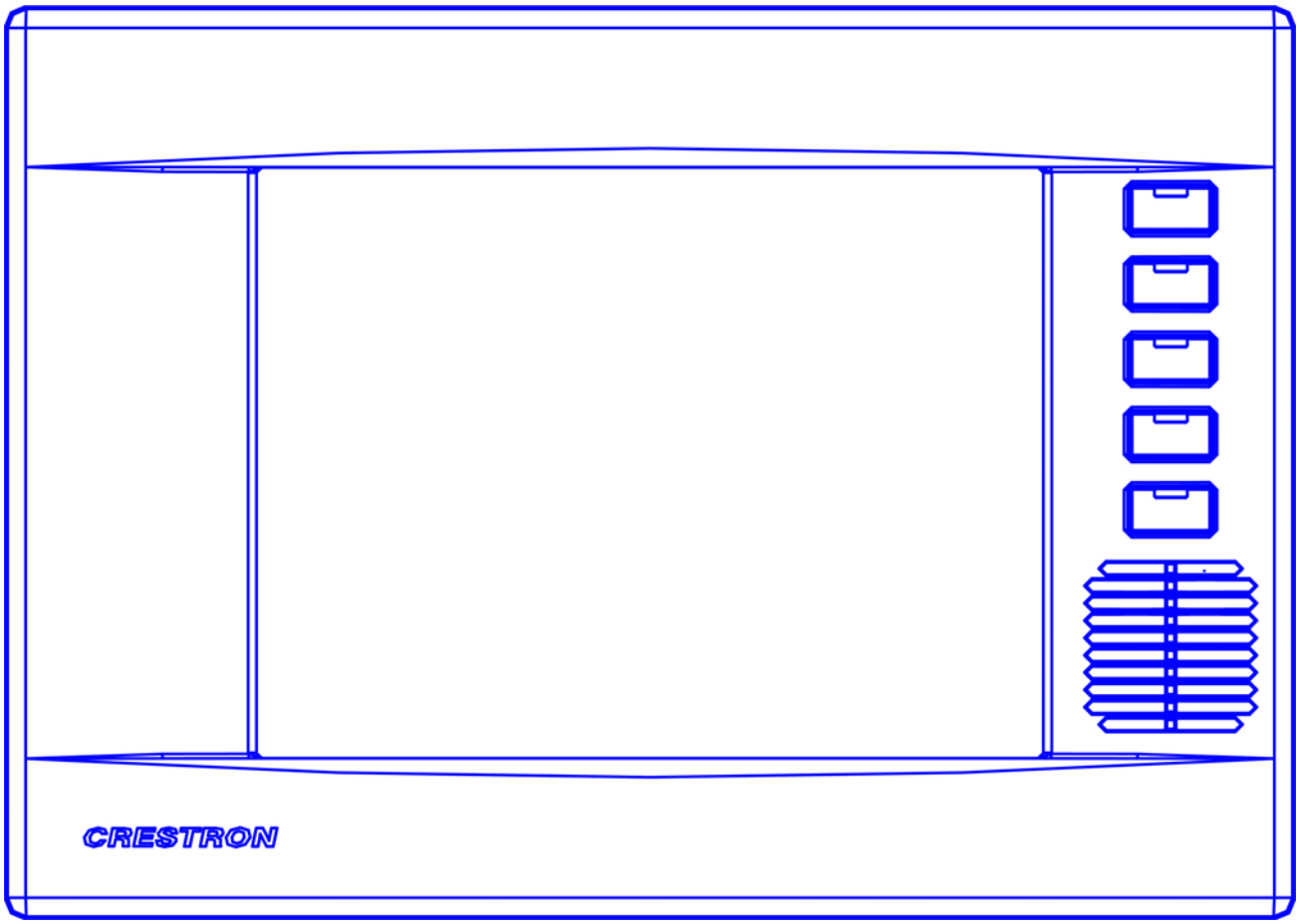


NOTE: Scale drawing not actual size.

Screen Size	6.4 inch (16.3 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	640 x 480 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	WAV, 8-bit PCM, mono, 8 kHz sampling rate
Optional Buttons	None

Form D – TPS-3100L Isys® 6.4-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

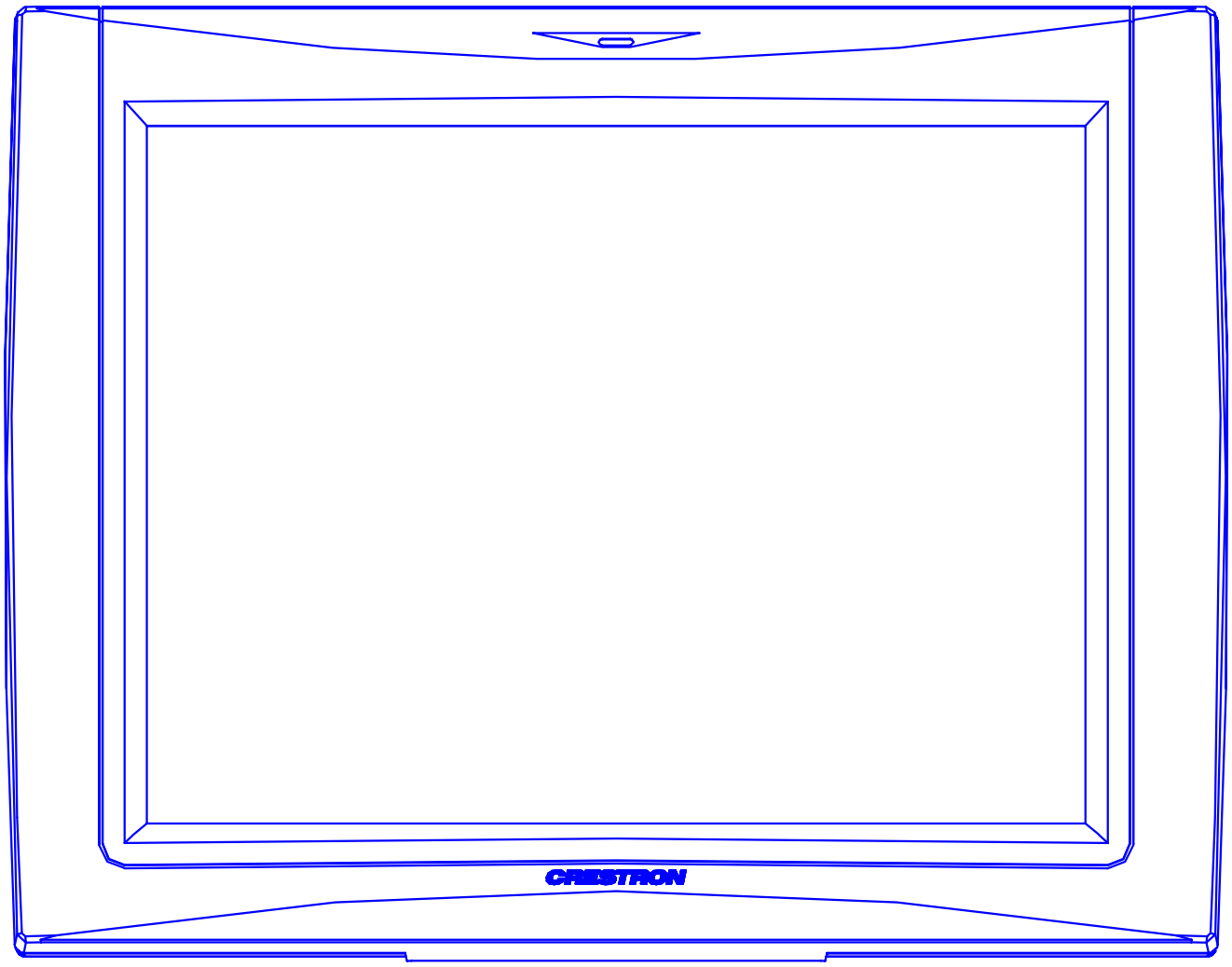


NOTE: Scale drawing not actual size.

Screen Size	6.4 inch (16.3 cm) diagonal
Aspect Ratio	4:3 SVGA
Resolution	640 x 480 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	WAV, 8-bit PCM, mono, 8 kHz sampling rate
Optional Buttons	(5) DB12-BTN Engravable button cap

Form D – TPS-4000 Isys® 10.4-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

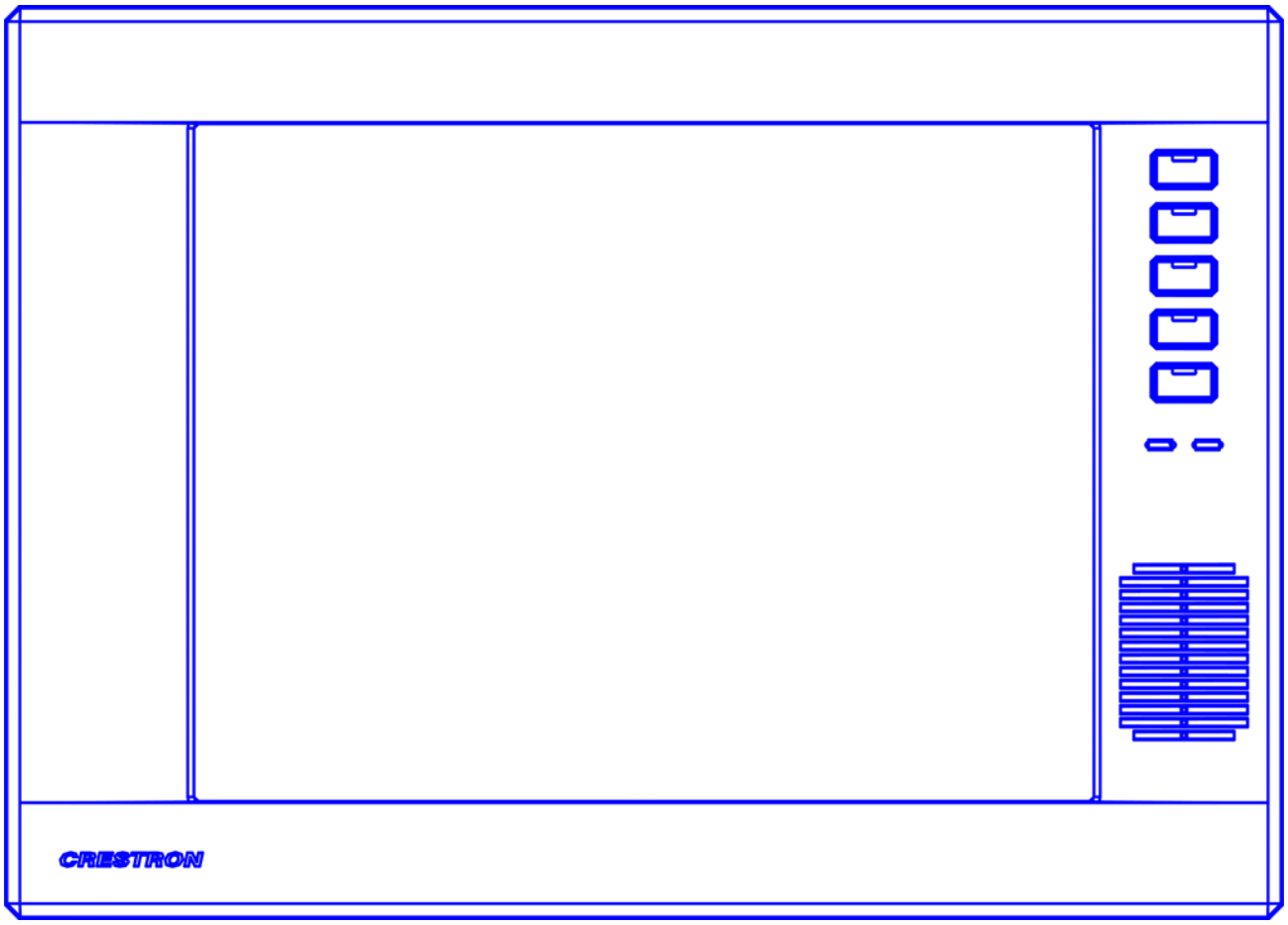


NOTE: Scale drawing not actual size.

Screen Size	10.4 inch (26.4 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	640 x 480 pixels
Graphic Capability	16 Bit non-palette graphics with color key video window capability, 65,536 colors
Audio	WAV, 8-bit PCM, mono, 8 kHz sampling rate
Optional Buttons	None

Form D – TPS-4000L Isys® 10.4-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

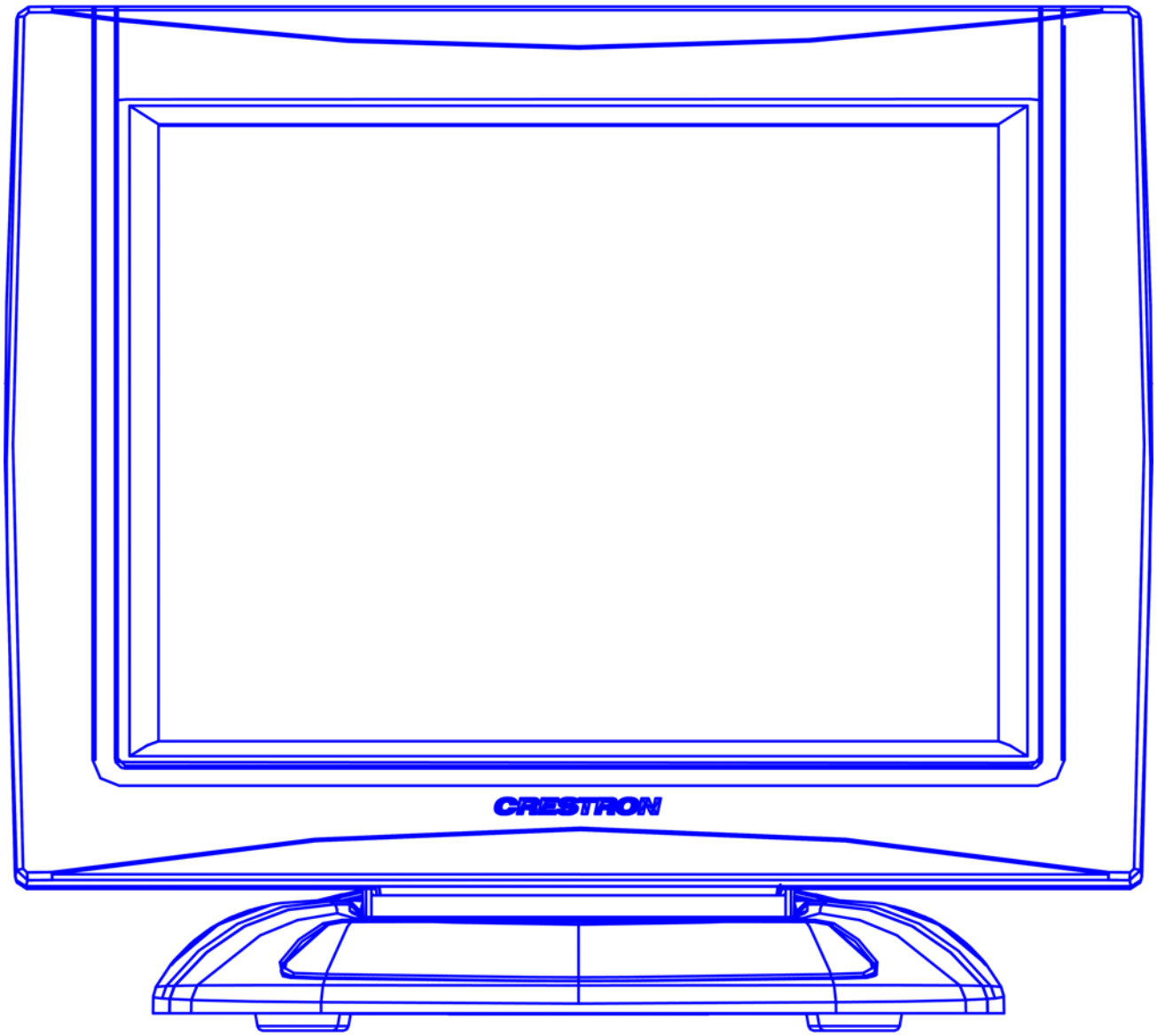


NOTE: Scale drawing not actual size.

Screen Size	10.4 inch (26.4 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	640 x 480 pixels
Graphic Capability	16 Bit non-palette graphics with color key video window capability, 65,536 colors
Audio	WAV, 8-bit PCM, mono, 8 kHz sampling rate
Optional Buttons	(5) DB12-BTN Engravable button cap

Form D – TPS-4500 Isys® 12-inchTilt Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

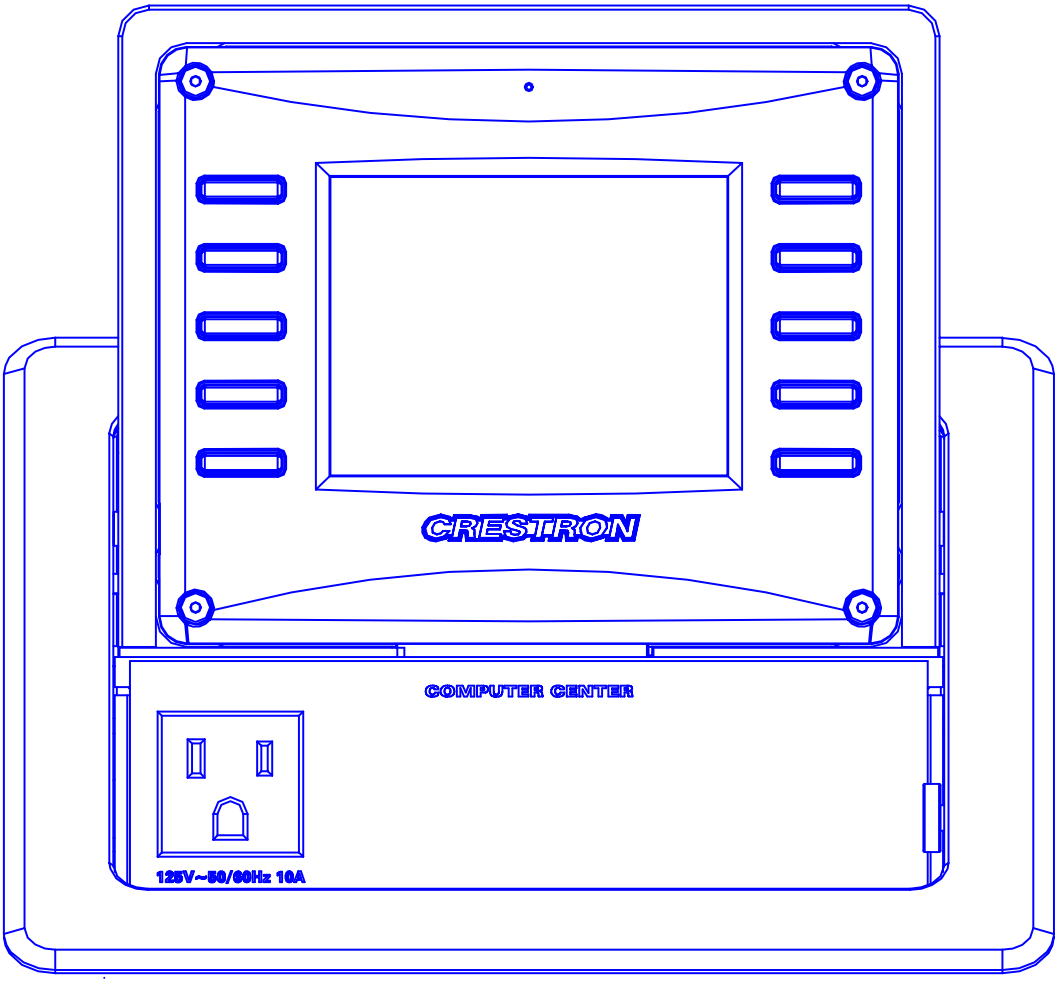


NOTE: Scale drawing not actual size.

Screen Size	12 inch (30.5 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	800 x 600 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	None

Form D – QM-FTCC-TPS4 QuickMedia FlipTop Touchpanel Computer Center and C2N-FT-TPS4 FlipTop Touchpanel Control Center

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

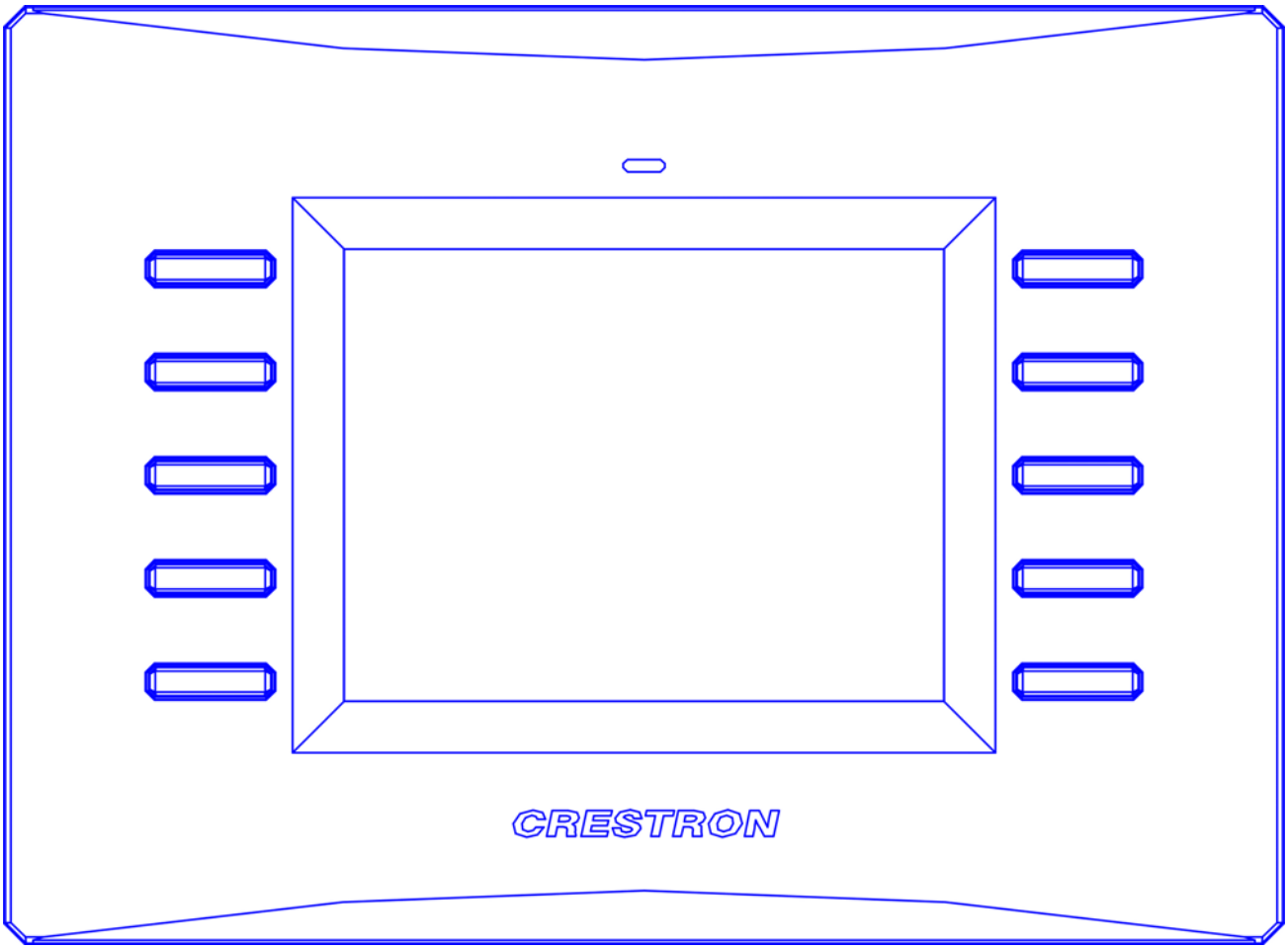


NOTE: Scale drawing not actual size.

Screen Size	3.6 inch (9.1 cm) diagonal
Aspect Ratio	4:3 XGA
Resolution	320 x 240 pixels
Graphic Capability	18-bit, 262,144 colors
Buttons	(10) translucent pushbuttons, white LED backlit, programmable

Form D – TPS-4L Isys® 4-inch Wall Mount Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

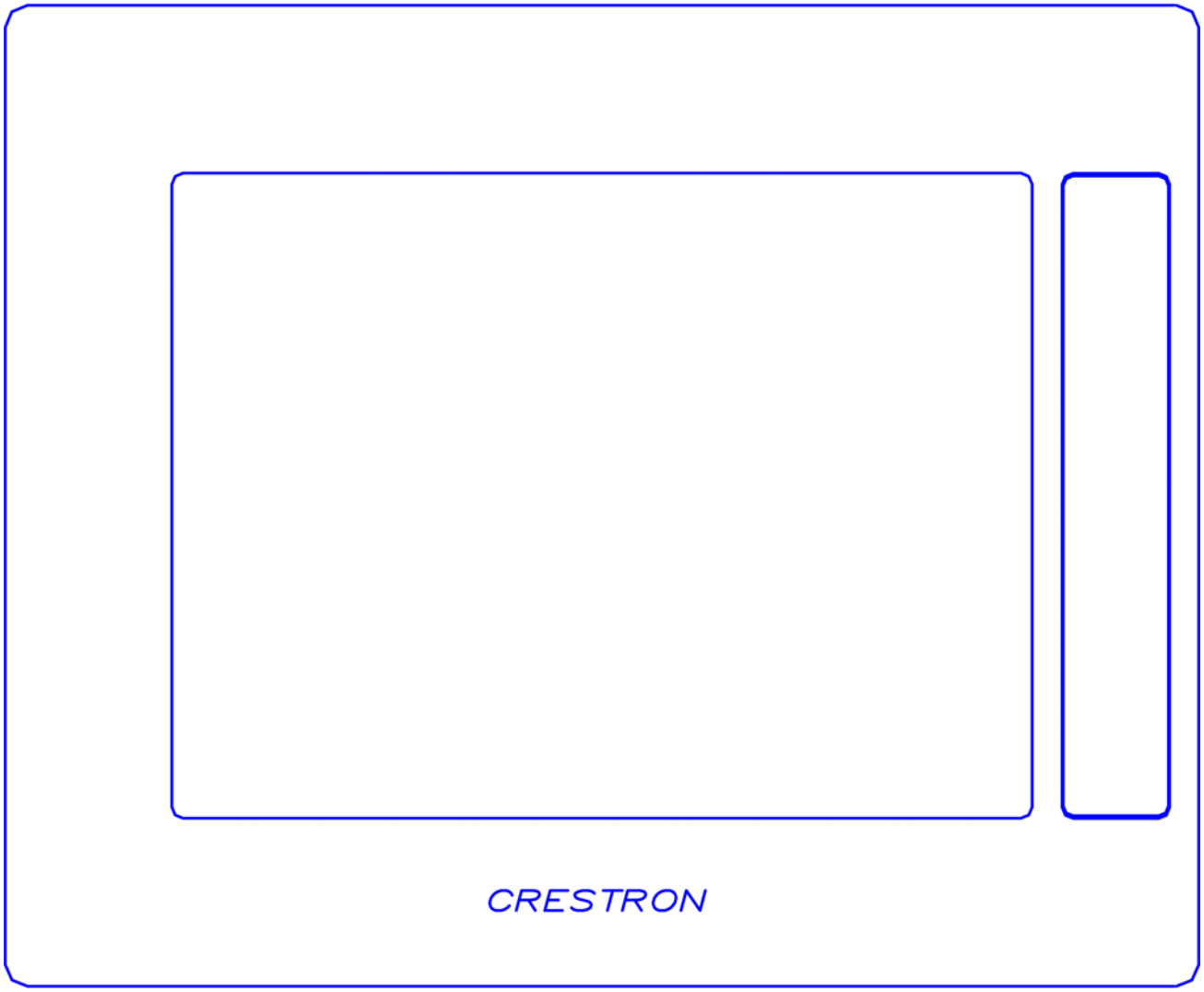


NOTE: Scale drawing not actual size.

Screen Size	3.6 inch (9.1 cm) diagonal
Aspect Ratio	4:3
Resolution	320 x 240 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	8-bit PCM, mono, 8 kHz sampling rate

Form D – TPS-5000 Isys® 12-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

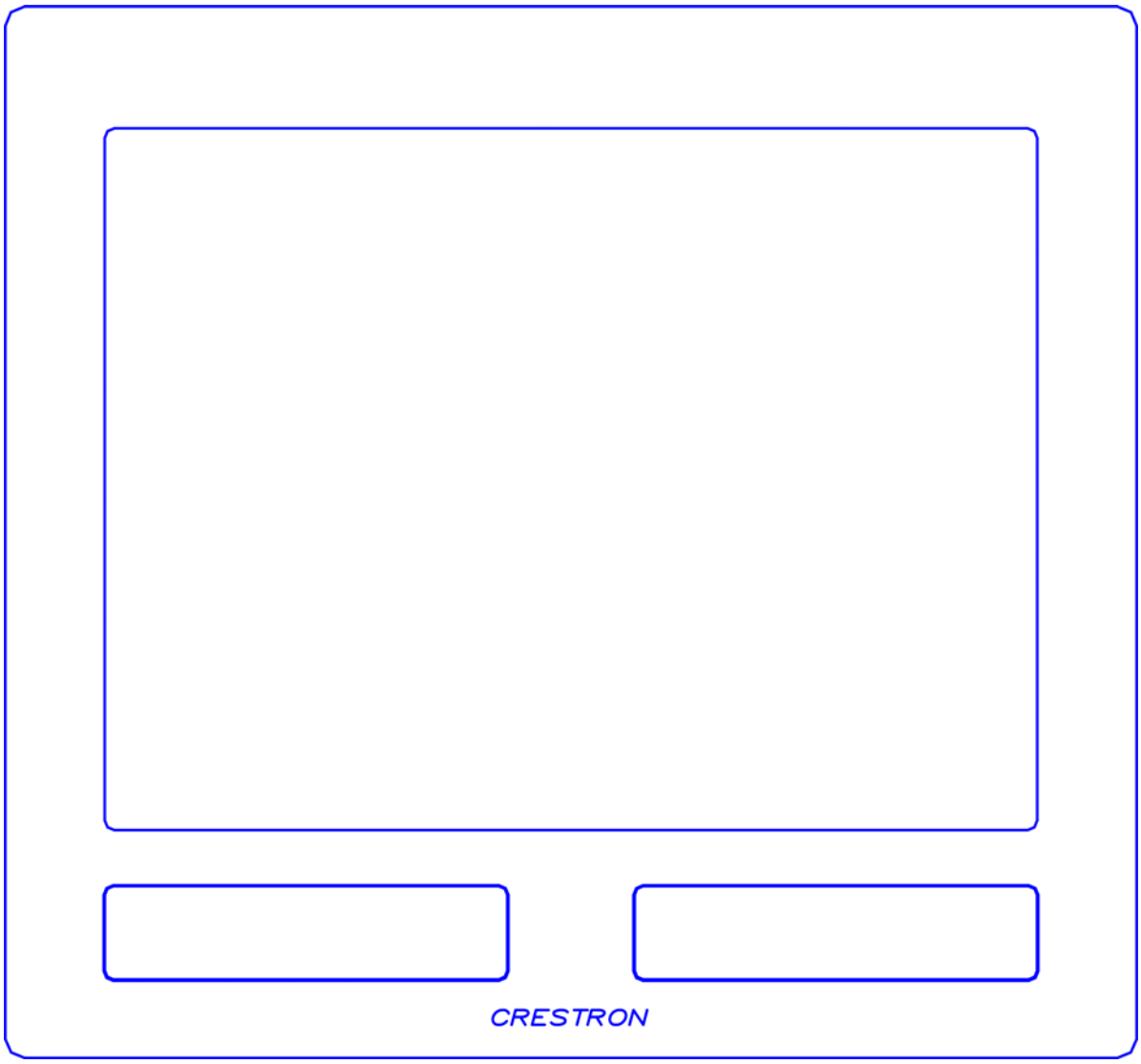


NOTE: Scale drawing not actual size.

Screen Size	12 inch (30.5 cm) diagonal
Aspect Ratio	4:3
Resolution	800 x 600 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors (262,144 colors for video with appropriate extension card)
Audio	8 & 16 bit PCM, mono & stereo, 8 – 44 kHz sampling rates

Form D – TPS-6000 Isys® 15-inch Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	

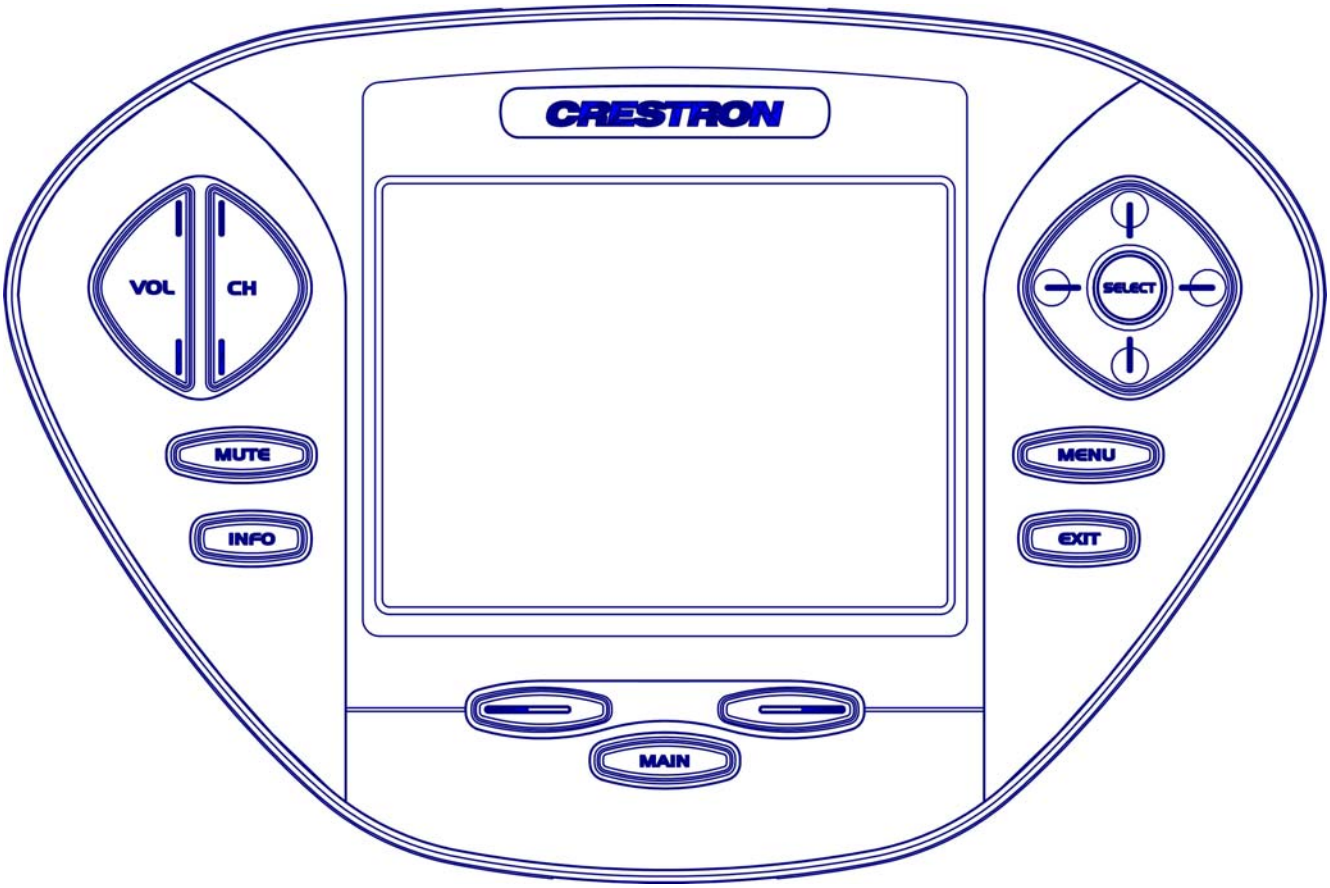


NOTE: Scale drawing not actual size.

Screen Size	15 inch (38.1 cm) diagonal
Aspect Ratio	4:3
Resolution	1024 x 768 pixels
Graphic Capability	16 Bit non-palette graphics with color key video window capability, 65,536 colors (262,144 colors for video with appropriate extension card)
Audio	8 & 16 bit PCM, mono & stereo, 8 – 44 kHz sampling rates

Form D – MT-1000 MiniTouch Handheld Wireless Touchpanel

Project Name	Date
Order/Quote #	Page of
Screen Name and Location	



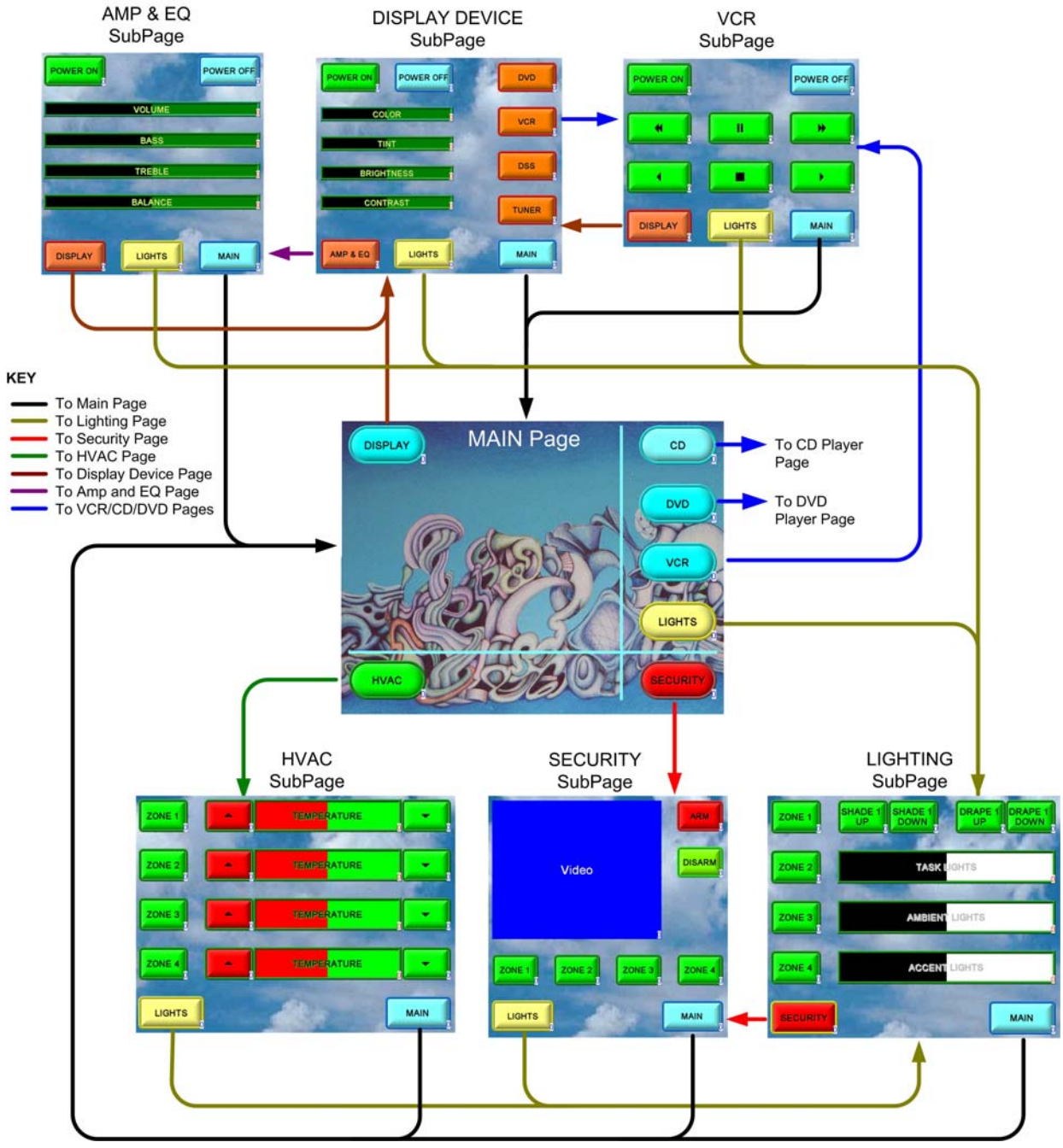
NOTE: Scale drawing not actual size.

Screen Size	3.8 inch (9.65 cm) diagonal
Resolution	320 x 240 pixels
Graphic Capability	16 Bit non-palette graphics, 65,536 colors
Audio	WAV File 8 & 16 bit PCM, mono & stereo, 8 – 22 kHz sampling rates

Control System Block Diagrams

The following block diagram is an example of a simplified control system, showing the relationship of pages. The arrows represent page flips. Creating a similar diagram for your system is a highly recommended method of organizing your project by allowing you to visualize the entire system. This will make the task of specifying the controls that appear on each screen much simpler. Refer to Appendix B: Touchpanel Design Example on page 57 for a real example of touchpanel design.

Example Block Diagram – Images Made with VT Pro-e



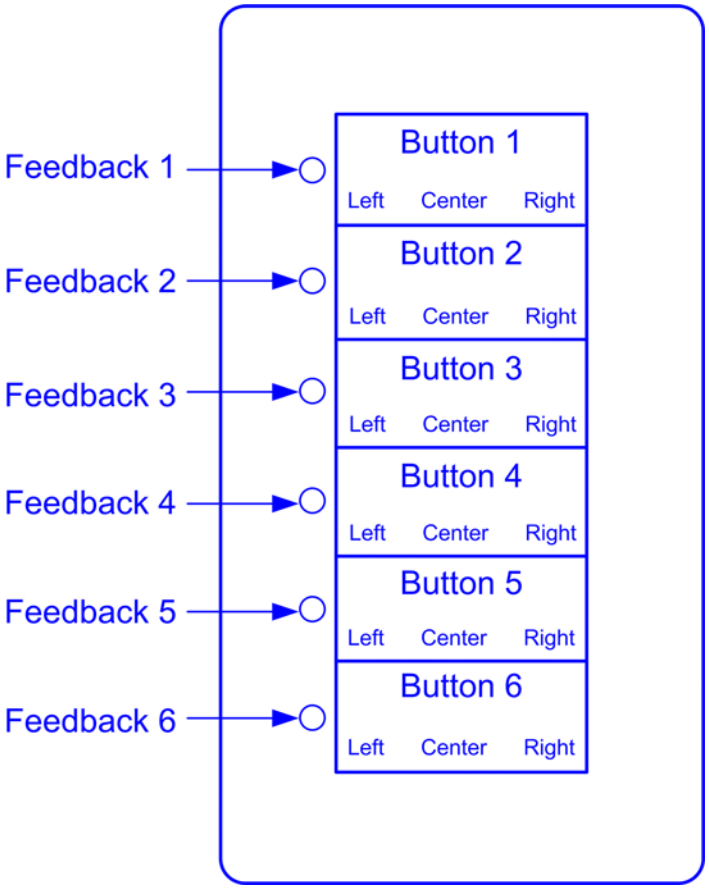
Form E, Button Panel Specifications

C2N-CB Series Cameo Keypads Description

The C2N-CB may have one to six switches, each programmable for left/center/right "rocker" action, single press operation, or press/hold mode, enabling up to 18 functions.

Each Cameo keypad is supplied with six single-row switch caps, three double-row switch caps, and two triple-row switch caps as well as two single-row button blanks, one double-row button blank, and one triple row button blank—any combination may be used.

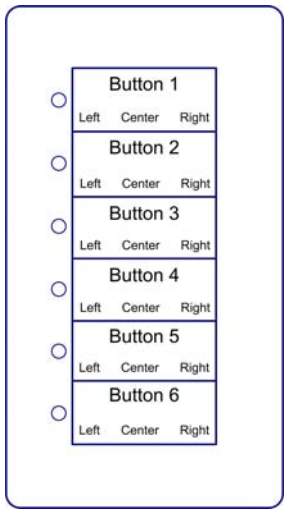
To the left of each button an independently addressable white feedback LED indicates active switch status. The intensity of these feedback LEDs is programmable from 0 to 100%.



The switch caps have white LED backlighting that is programmable from 0 to 100% intensity as well. In certain circumstances, such as when using black switch caps, true backlighting is not practical. Instead, the program can use the feedback LEDs to perform a backlighting function, turning them all on but at a fixed percentage of their active state intensity.

Form E – C2N-CB Series Cameo Keypad Specification

Project Name	Date
Order/Quote #	Page of
Location	



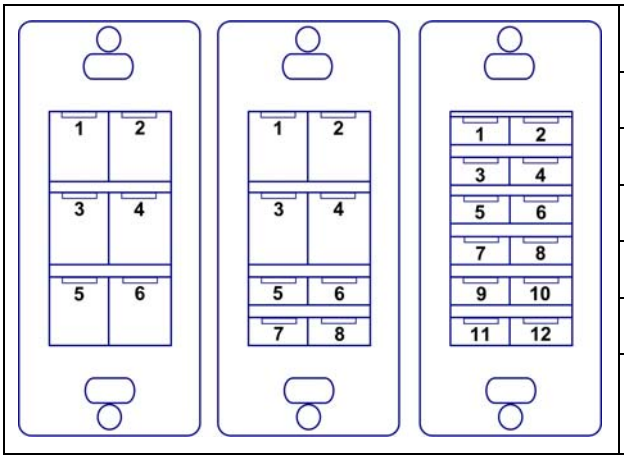
Button Engraving
1
2
3
4
5
6
Notes

Button Number	Function	Left	Center	Right	Backlight %	Feedback %

Form E – C2N-DB6/8/12 Decorator Keypad Specifications

Project Name	Date
Order/Quote #	Page of
Location	

The C2N-DB6/8/12-series Decorator Wall Panels are wall-mounted, single-gang user interfaces. Panels are available in 6-, 8-, or 12-button configurations and accommodate standard faceplates. The intensity level for each button LED can be set from 0 to 100%.

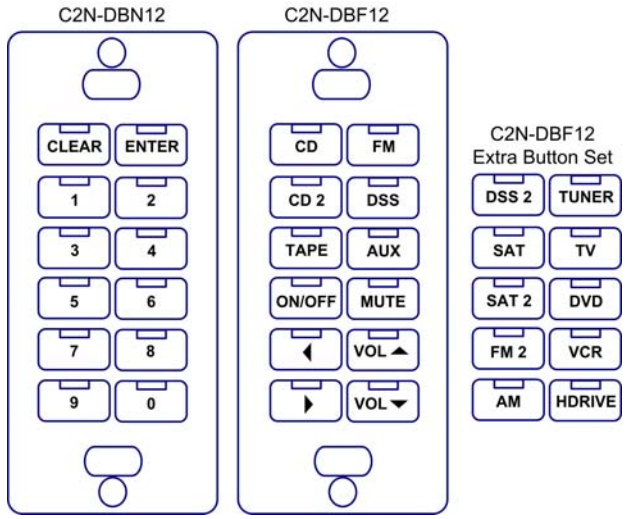


Button Engraving	
1	2
3	4
5	6
7	8
9	10
11	12

Button Number	Function	Feedback %

Form E – C2N-DBN12 & C2N-DBF12 Decorator Keypad Specifications

Project Name	Date
Order/Quote #	Page of
Location	



Each keypad has 12 buttons with LED windows.

The C2N-DBN12 has a CLEAR button, an ENTER button, and numeric digit buttons 0 through 9.

The C2N-DBF12 has six source selector buttons, an ON/OFF button, a MUTE button, device transport control and volume control buttons.

A kit with additional source buttons for the C2N-DBF12 is also provided.

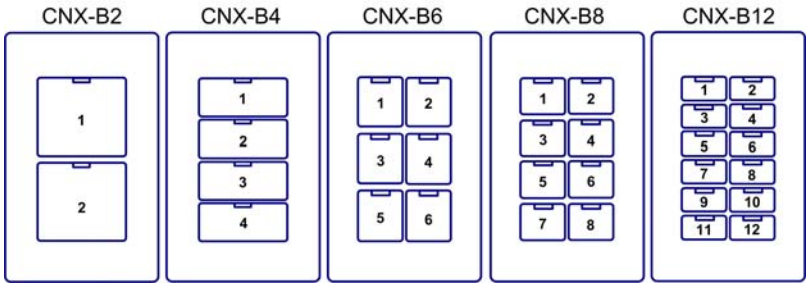
Source Button	Function	Feedback %

Form E – CNX-B2/B4/B6/B8/B12 Single Gang Keypads Specifications

Project Name	Date
Order/Quote #	Page of
Location	

The feedback LED illumination is independently addressable, and is programmable. These keypads also contain a temperature sensor that reports to the Cresnet control system, and an audio speaker that can provide audio feedback via WAV sound files. Backlight and button LED intensity levels can be set from 0 to 100%. Similarly, the speaker volume level can be set from 0 to 100%. The number of buttons on a keypad can be 2, 4, 6, 8, or 12. They are arranged numerically from left to right, top to bottom and each has an associated LED window.

Numbers in the illustration are for programming only.



☐ ☐ ☐ ☐ ☐

Use checkbox to note model.

Button Engraving	
1	2
3	4
5	6
7	8
9	10
11	12

Button Number	Function	Engraving	WAV File	Backlight %	Feedback %

Lighting Control Interface

Crestron lighting and automation solutions provide unmatched value and performance, comprising a comprehensive line of modular enclosures, wall box dimmers, and climate control thermostats, all under the command of the powerful 2-Series control system.

Converting Crestron Components to a User-Friendly Lighting Interface

Crestron offers the most complete selection of user interfaces available. Elegant keypads and touchpanels provide convenient fingertip control access throughout any environment. Every installation is fully customizable to attain streamlined control and automation of complex system functions, and end-user comfort. Nearly limitless connectivity options are also available to support integration with non-Crestron components.

Crestron control can change the ambience of a room at the press of a button, schedule landscape lighting to turn on automatically at dusk, or remotely adjust the air conditioning from a mobile phone or PDA. Lighting, climate control, security, access control, irrigation, window treatments, pool and spa, A/V, and other systems all integrate seamlessly.

In order to properly design a lighting control system for your project we require some specific information.

- Project name
- Project Location
- Contact information for the project system designer
- A load schedule or panel schedule indicating controlled lighting loads types (incandescent, magnetic or electronic low voltage, fluorescent, etc.) and the number of types assigned to each circuit.
- The voltage for each load.
- The ballast types specified for fluorescent dimming (2, 3 or 4 wire) or ELV if applicable.
- The Emergency power requirements – indicating which loads are connected to emergency power
- The Spare circuits required
- The External systems interface(s)
- Any other special considerations, (i.e., specific panel locations, main or branch circuit breaker requirements, etc.)

The touchpanel GUI (Graphical User Interface) and the keypads are the only components that the end-user sees or touches. It is the user's primary point of interaction with the complete system. So it stands to reason that the quality of the GUI design and button layout largely determines the ultimate usefulness of the entire system.

Use as many copies as necessary of the following forms to specify the user interface.

Lighting Control Programming Request – Keypads

Job Name: Date:

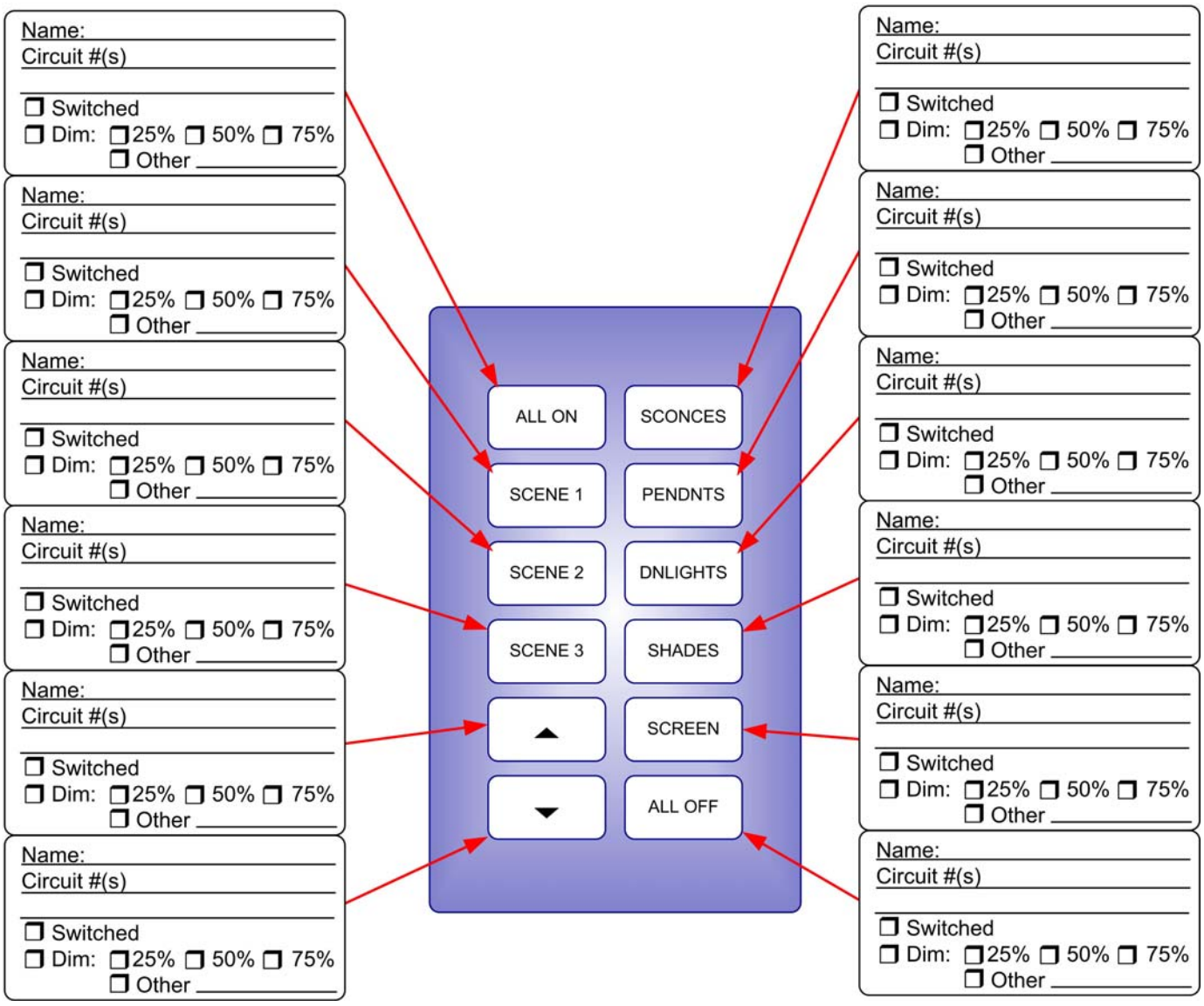
Load Name: Job #:

Location: Start Up Date:

Complete one of these forms for each keypad in the system. For keypads of less than 12 buttons, place an X in unused spaces
For symbol buttons, indicate what is controlled (i.e., last scene or shade) Indicate if buttons are backlit or engraved for CNX series
Indicate attached WAV files

Contact Name:

Contact Phone:



Lighting Control Programming Request – iLux

Job Name: Date:

Load Name: Job #:

Location: Start Up Date:

Contact Name: Contact Phone:

LOAD 1

Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other

LOAD 2

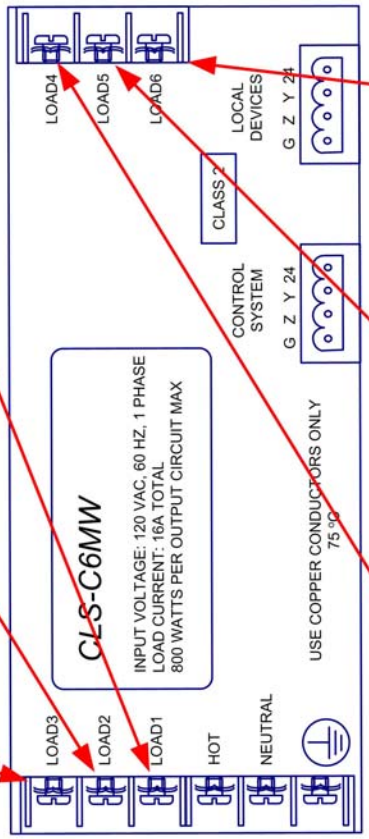
Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other

LOAD 3

Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other



LOAD 6

Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other

LOAD 5

Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other

LOAD 4

Name:
Circuit #(s)

❒ Switched
❒ Dim: ❒ 25% ❒ 50% ❒ 75%
❒ Other

Local Devices

Lighting Control Programming Request – CT-1000 Touchpanels

Job Name: _____ Date: _____

Load Name: _____ Job #: _____

Location: _____ Start Up Date: _____

Contact Name: _____ Contact Phone: _____

Complete one of these forms for each touchpanel page. For symbol buttons, indicate what is controlled (i.e., last scene or shade) Indicate attached WAV files.

Name: Preset 1
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name: Preset 2
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name: Preset 3
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name: Preset 4
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name: Preset 5
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

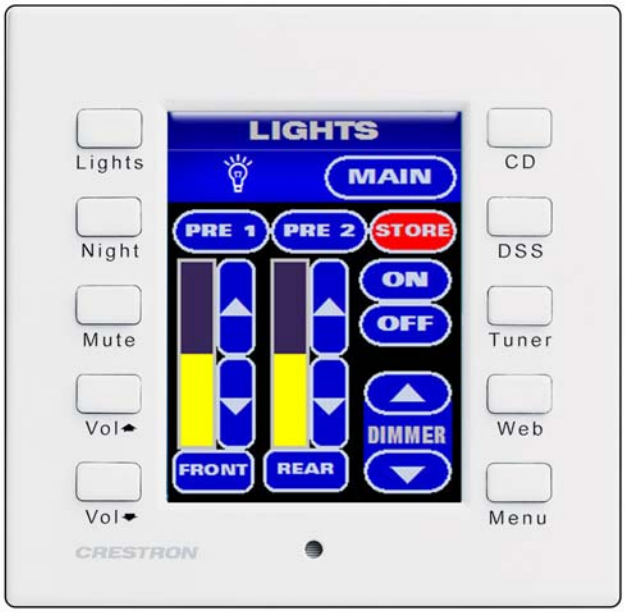
Name: FRONT Lights
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name: REAR
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other _____

❒ Return to Main Page Button
❒ Go To Next Lighting Page Button
❒ Slider Control(s) _____
❒ Step Controls _____
❒ Store Settings button
❒ Dimmer Up/Down Control
❒ ALL Lights On
❒ ALL Ligths Off

Lighting Page Example



NOTE: Maximum practical number of individual buttons per page: 20
Maximum practical number of individual sliders per page: 4

Lighting Control Programming Request – TPS-2000 Touchpanels

Job Name: Date:

Load Name: Job #:

Location: Start Up Date:

Contact Name: Contact Phone:

Complete one of these forms for each touchpanel page. For symbol buttons, indicate what is controlled (i.e., last scene or shade) Indicate attached WAV files.

Name: Preset 1
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name: Preset 2
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name: Preset 3
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name: Preset 4
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name: Preset 5
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

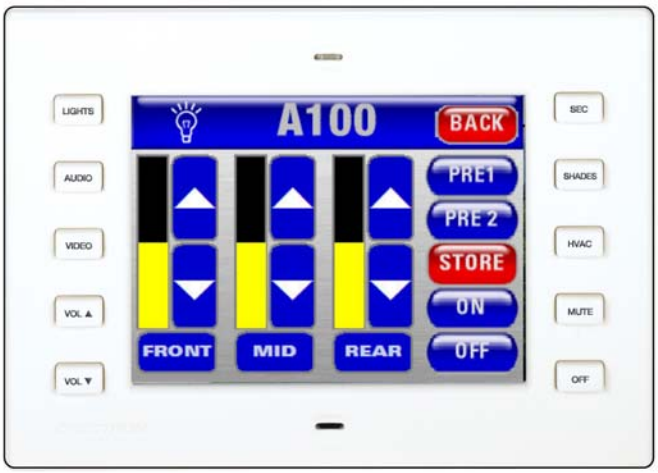
Name: FRONT Lights
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name: REAR
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

Name:
Circuit #(s)
❒ Switched
❒ Dim: ❒25% ❒50% ❒75%
❒ Other

❒ Return to Main Page Button
❒ Go To Next Lighting Page Button
❒ Slider Control(s) _____
❒ Step Controls _____
❒ Store Settings button
❒ Dimmer Up/Down Control
❒ ALL Lights On
❒ ALL Ligths Off

Lighting Page Example



NOTE: Maximum practical number of individual buttons per page: 20
Maximum practical number of individual sliders per page: 5

Appendix A: Touchpanel Objects

The following charts illustrate the objects that can exist on a touchpanel screen. When designing a touchpanel layout, it is important to keep it a relatively simple, clean design and easy to use. You must also take into account the limited screen area of each page and avoid overcrowding.

NOTE: Not all touchpanels support the entire list of objects described in this kit. Refer to the specific manual for details.

Buttons

A button triggers most of the actions in a control system. Buttons are available in many styles and can be any size. However, you must take the human interface into account and allow the button to be large enough for descriptive text and for ease of fingertip selection.

For smaller touchpanels, the minimum recommended size is 40 pixels wide by 40 pixels high.

For larger touchpanels, the minimum recommended size is 60 pixels wide by 50 pixels high.

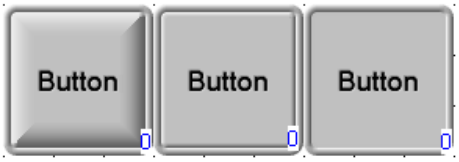
Button colors are limited by the size and type of touchpanel. For example, the TPS series supports up to 65,536 colors; the LC-1000 supports up to 256 colors. You can choose a basic color or define the Red Green and Blue values.

The number in the lower right corner of each button represents a “join” to a particular function as defined in the programming. Each join number is unique and serves a specific purpose.

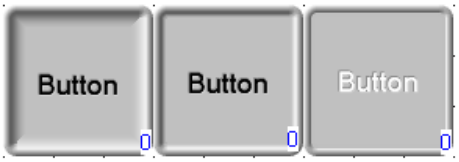
A key-click sound can be assigned to a button. For touchpanels that support audio, a button press can also initiate a WAV file, and provide an audio feedback for a particular function.

Example Styles

Most Crestron touchpanels support a variety of button styles, including shaded, three-dimensional, and two-dimensional. Shown here with optional frames. In addition, buttons can be round, elliptical, Ob-round, or have a particular corner radius applied.

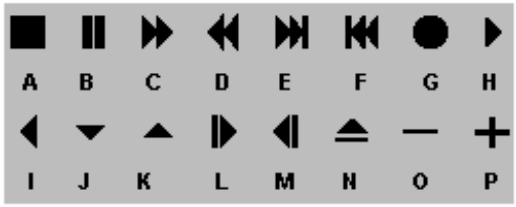


The buttons provide positive visual feedback when pressed.

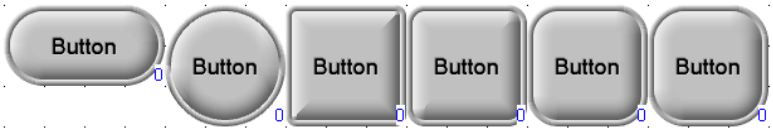


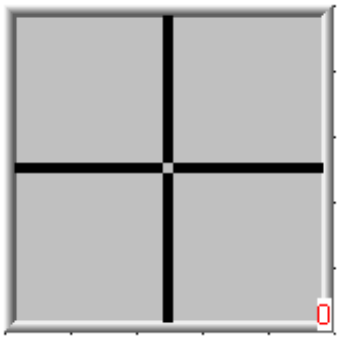
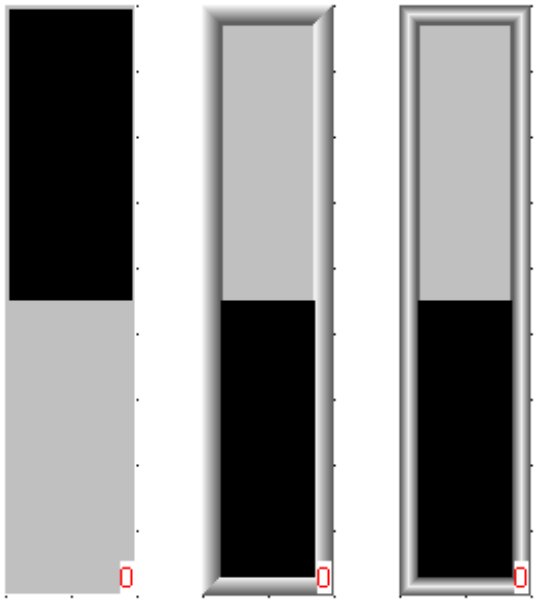
The amount of text that can fit on a button is governed by the button size and the font size and type.

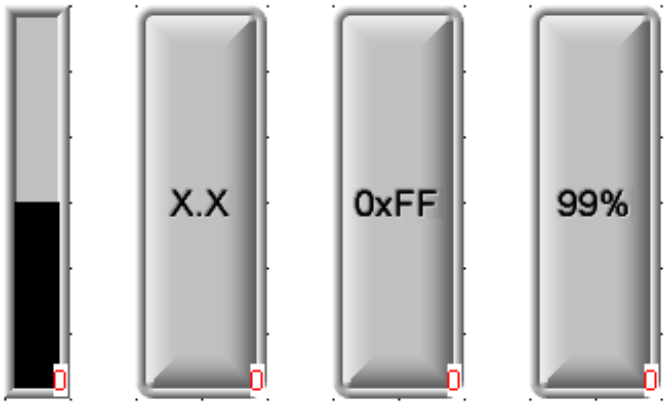
The Crestron Transport Font, available in VT Pro-e, consists of symbols that represent standard device functions such as Fast Forward, Rewind, Volume Up, Volume Down, etc.



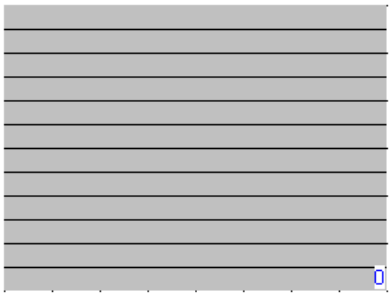
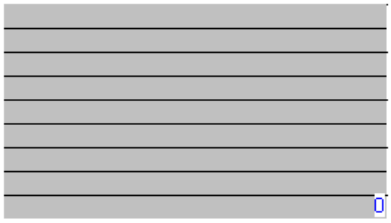
Shown here are additional button shape choices: Obround, Elliptical, and Radius 2 through 5.

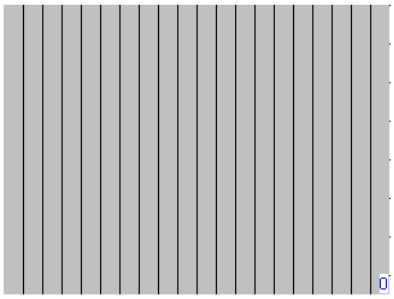
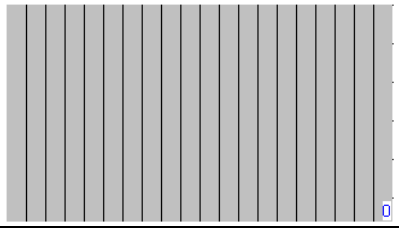


Sliders	Example Styles
A slider controls and displays an analog value, such as lighting, temperature, audio volume, balance, bass or treble. Sliders can be two-dimensional, raised, or neon framed. The thickness of the slider frame (or None for no frame) may be selected. The color of the face, frame, text and indicator bar may all be chosen independently. Choices for the type of indicator are Bar, Line, or None. When choosing a line slider, you may optionally control two separate analog functions with one slider. 	Bar sliders shown here in two-dimensions, raised, and neon.  Sliders may be drawn vertically or horizontally.

Gauges	Example Styles
A gauge displays analog levels such as lighting, temperature, or audio volume. Digital Gauge A digital gauge displays values such as lighting levels, temperature, or audio volume, in digital format (with or without a decimal point). Hex Gauge A hex gauge displays values such as lighting levels, temperature, or audio volume, in hexadecimal format. Percent Gauge A percent gauge displays values, such as lighting levels, temperature, or audio volume, as a percent.	Gauges may be horizontal or vertical. Pictured from left to right; graphic gauge, digital gauge, hex gauge, and percent gauge. 

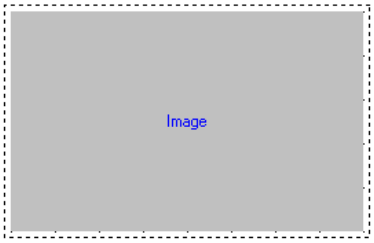
Clock	Example Styles
A clock object displays the time of day in either a 12-hour or 24-hour format. Seconds and a blinking colon may also be chosen. Clock objects can be embossed, raised, shadowed aliased, or anti-aliased.	 The thickness of the frame (if you use one), the color for the clock face, frame and text, and the font can all be selected.

Video Objects	Example Styles
A video object (often referred to as a video window) displays real-time video on the screen. Recommended minimum video window size (4:3 aspect ratio) is 93 pixels by 69 pixels. Maximum video window can be full screen. A full screen transparent button can be placed on top of the video object to return to the previous page. Video objects can be any size or set to the 4:3 or 16:9 aspect ratio.	4:3 Aspect Ratio  16:9 Aspect Ratio 

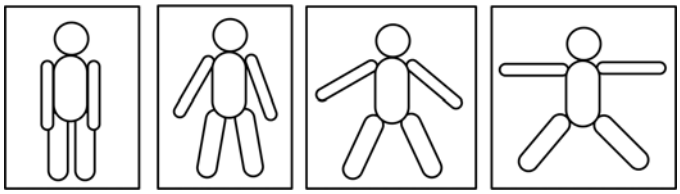
RGB Video Objects	Example Styles
An RGB video object (often referred to as an RGB video window) displays real-time RGB video on the screen. Recommended minimum RGB video window size (4:3 aspect ratio) is 93 pixels by 69 pixels. Maximum video window can be full screen. A full screen transparent button can be placed on top of the RGB video object to return to the previous page. RGB Video objects can be any size or set to the 4:3 or 16:9 aspect ratio.	4:3 Aspect Ratio  16:9 Aspect Ratio 

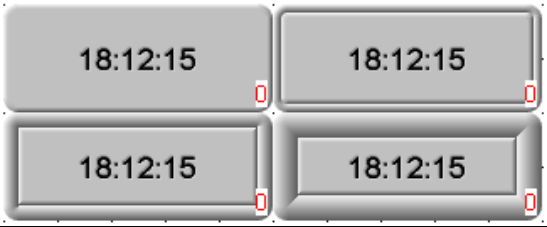
NOTE: All RGB and Video objects are scaled.

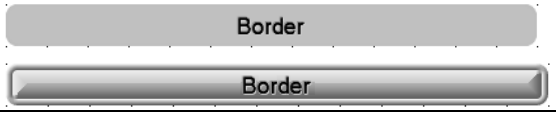
Text Box	Example Styles
A text box enables you to add headings, titles, instructions, or other text to a page.	 Font size, color, type and position are all selectable.

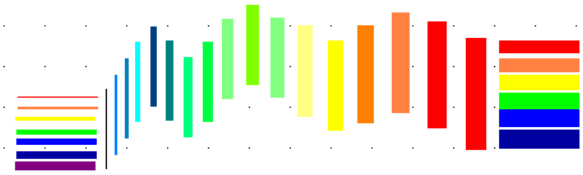
Image	Example Styles
An image object enables you to add a decorative image to a page.	 The image object can be any size and contain BMP, PCX, DIB, or a JPEG image.

Legends	Example Styles
A legend is similar to a button in that it has two states. However, it cannot trigger a control system action; rather, it is typically used to control the display of text via its digital feedback signal.	Color, frame thickness, style, text, font and font color are all selectable. Legends may also be displayed as a round, elliptical, Ob-round, or radius selected object.

Animation	Example Styles
An animation object creates the illusion of movement on the page, by using a succession of static images that are displayed at a set speed. You can specify the translucency of an animation object from 0% (opague) to 100% (completely transparent). If the resolution of any image is higher than 16 bits (65536 colors), VisionTools Pro-e will automatically convert it to 16 bits when uploading. The resolution of every frame in the animation sequence will be converted to the highest resolution of any frame in the sequence.	Example of four animation frames, they can be BMP, DIB, JPG or PCX format.  Images can be played forward or forward and backward. The associated logic permits the animation to run with many options. For example, only when a certain button is pressed.
NOTE: There is no specific rule about how many animations or how large an animation can be for a page. However, too many animations or large animations can degrade performance. A good rule to keep in mind is to limit the animation size to one quarter of the total screen size.	

Timers	Example Styles
A timer measures and displays time in two formats, hours, minutes and seconds, or hours and minutes. Maximum range is zero to 18H:12M:15S. Timers can be used for example to display values that are specific to the touchpanel, such as timeouts.	Examples of timers, left to right, without border, thin border, medium border, and thick border. 

Borders	Example Styles
A border is a decorative element that serves to group together related objects and to help visually clarify and organize the page. A border may contain text.	Borders may be any color, 2-dimensional, 3-dimensional, shaded, and may be framed. Shown here, 2D, unframed and shaded framed. 

Lines	Example Styles
A line object enables you to add a line of any angle to the page.	Lines can be any color, and from 1 to 16 pixels wide. 

Web Objects

Web Map (e-Control, HTML/Java)

A Web map is a graphic image in an HTML page that contains links to other targets. The clickable areas in the image are referred to as the "hit points." When users click these hit points, the Web browser displays the target, which can be another page, a URL, or a different area within the same (large) page.

Web Anchor (e-Control, HTML/Java)

A Web anchor allows the Web browser to jump to a different section of the current HTML page—either when a button or hit point is clicked—while giving the appearance to the user that an entirely different page is being displayed. In this way you can design a single HTML page that downloads once, rather than a number of pages that each take time to download.

Web Marquee (e-Control, HTML/Java)

A Web marquee displays scrolling text within a framed box.

Web Dial (e-Control, HTML/Java)

A Web dial enables the mouse pointer to control and adjust analog values such as lighting levels, audio volume, and temperature.

XPanel Projects (e-Control 2)

Within VTPro-e are four XPanel options for IT and A/V integration.

XPanel EXE provides ultra fast and secure control through an executable application rather than web pages.

XPanel IE provides web browser based control using ActiveX rather than Java to attain true touchpanel behavior. XPanel IE Web pages are hosted on a 2-Series control system allowing control on the fly from any connected PC simply by launching a browser and entering the IP address (or URL) of the control system.

XPanel PDA brings the power of e-Control 2 to any Pocket PC™2002 device. XPanel PDA delivers benefits similar to XPanel EXE on smaller PDA and Tablet PC formats.

XPanel Emulator allows the control system programmer to easily generate an executable file that emulates the entire flow and function of an Isys touchpanel or
e-Control 2 XPanel project right on any Windows PC.

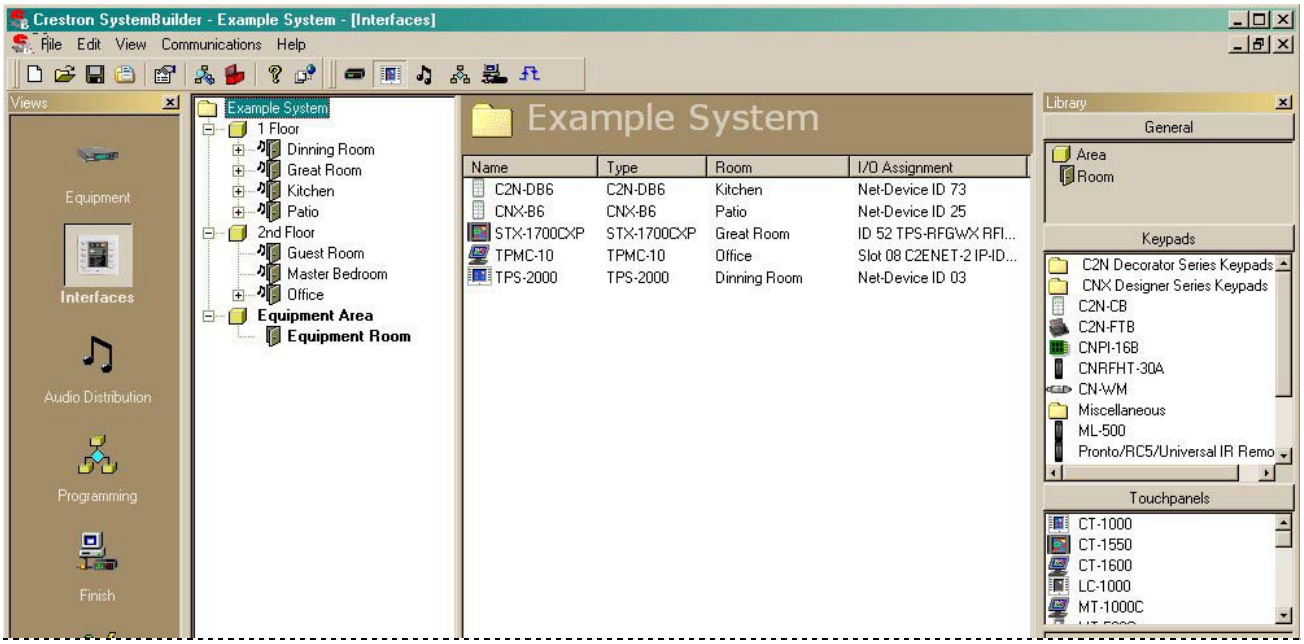
Appendix B: Touchpanel Design Example

The following example of touchpanel design is based on the following parameters, and uses a PRO2 Professional Dual Bus Control System.

Interface	Location
C2N-DB6 Keypad	Kitchen
CNX-B6 Keypad	Patio
STX-1700CXP Touchpanel	Great Room
TPMC-10 Touchpanel	Office
TPS-2000 Touchpanel	Dining Room

Controlled Equipment	Location
CD Jukebox	Equipment Room
DSS Receiver	Equipment Room
DVD	Equipment Room
FM TV Tuner	Equipment Room
Plasma TV	Equipment Room
Single Room Lighting	Equipment Room

SystemBuilder Interface View of Example System



SystemBuilder can generate a complete Bill of Materials:

Qty	Name	Description
1	PRO2	Professional Dual Bus Control System

Qty	Name	Description
1	CNX-PAD8A	8 Source/8 Room Enhanced Professional Stereo Audio Distribution Processor
1	CNAMPX-16X60	16 Channel Intelligent Amplifier
1	TPS-RFGWX	2-Way RF Transceiver/Wireless Gateway for Isys Tilt Models
1	C2N-TTVFM	TV and FM Tuner, the C2N-TTVFM is a cable-ready television tuner and FM radio tuner.
1	C2N-TAMWX	AM/Weather Radio Tuner

Qty	Name	Description
1	C2N-DB6W	6 button decorated style keypad, backlit, white
1	CNX-B6W	6 button keypad, backlit, white
1	TPS-FPW	White Faceplate

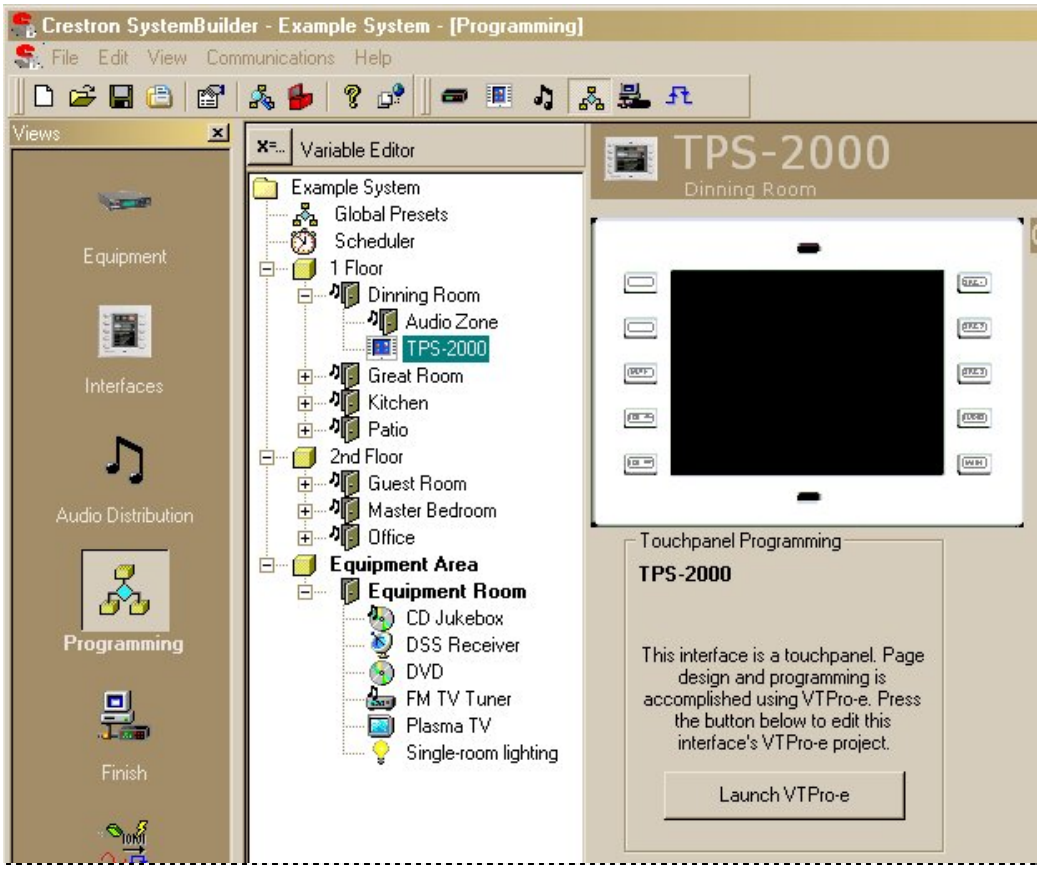
Qty	Name	Description
1	TPS-2000L	Isys 5" Lectern/Wall Mounted Touchpanel
1	ST-1700C	1-Way 6" Wireless Color Touchpanel
1	1700C-BTNB	Black buttons only (no faceplate)
1	TPMC-10	Isys i/O WiFi Tablet Touchpanel

Qty	Name	Description
1	CLX-1DIM4	1-20A Feed, 4 Controlled Circuits Dimmer

Qty	Name	Description
1	CLT-1DIM4	Terminal block for CLX-1DIM4

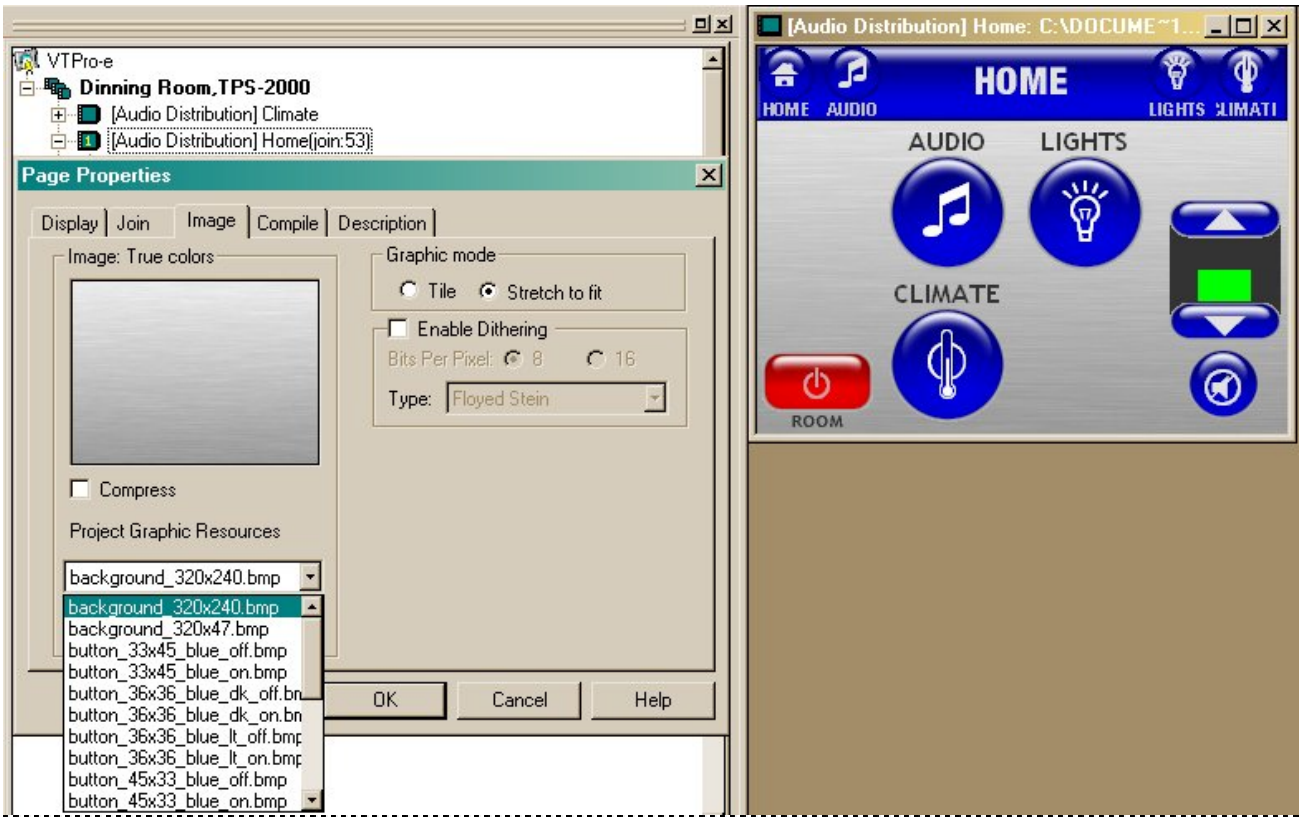
Qty	Name	Description
1	C2ENET-2	Dual Port Ethernet Card for 2-Series Control Systems

In SystemBuilder, click the **Programming** button and select the TPS-2000. You can launch VT Pro-e directly from here.

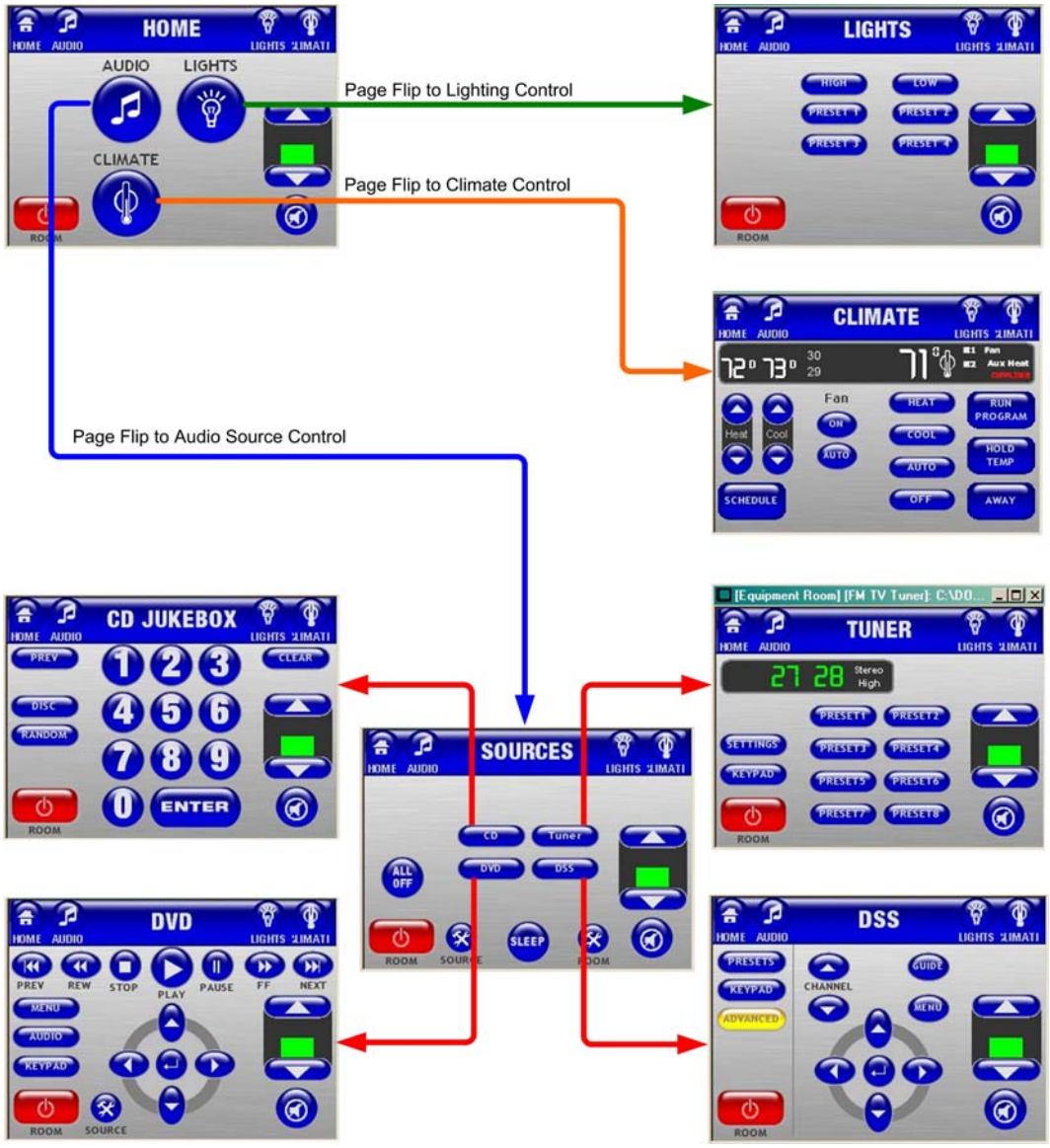


The following touchpanel programming example was created using the **TPS-2000 gel blue.vtt** template.

When a template is applied, each page may select from a list of **Project Graphic Resources** to maintain professional consistency and usability throughout the design process.

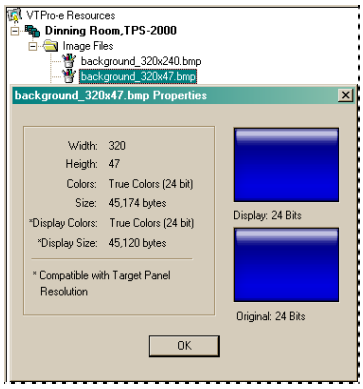


The Home page in the following example is linked to the transport pages for the DSS, CD Jukebox, and DVD. The climate control and tuner control are also included. Refer to the following page.

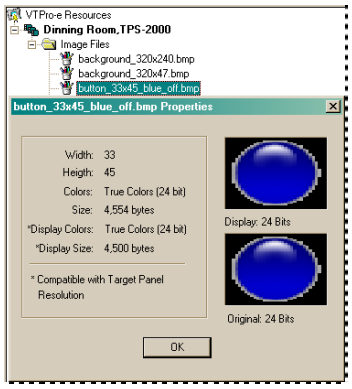


Examples of Image Resource Files Used for This TPS-2000 in VT Pro-e

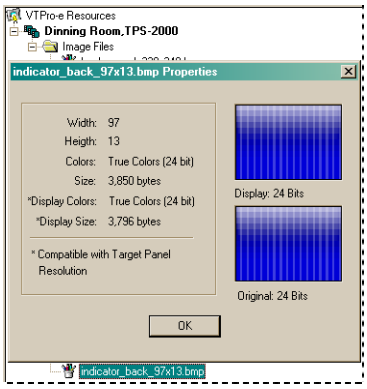
Background Resource Example



Button Resource Example



Indicator Resource Example



Appendix C: Color Theory

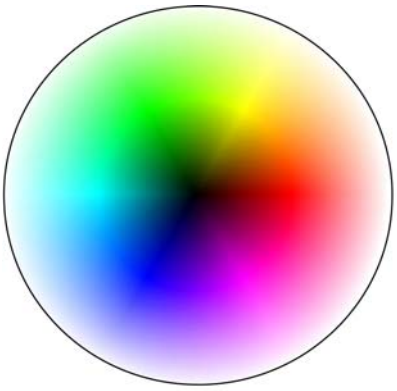
The following color definitions may be useful when considering interface design.

- 8-bit color allocates 8 bits (1 byte) of memory to each pixel, up to 256 different colors.
- 16-bit color allocates 16 bits (2 bytes) of memory to each pixel, producing 65,536 colors.
- 24-bit color uses 24 bits (3 bytes) of memory per pixel in a color image, up to 16,777,216 colors can be represented in the color palette.
- True color is 32-bit color. The extra byte, called the alpha channel, is used for control and special effects information (ex. transparency).

Colors can appear in nearly infinite variation, which can make selecting appropriate colors for your project difficult. This guide will attempt to simplify your choices by presenting a few basic principles of color theory.

There are three basic (primary) video colors, red, green, and blue. All other colors are derived from these three.

Mixing two of the primary colors creates the secondary colors. Red plus green = yellow, Blue plus red = magenta, and blue plus green = cyan.



Light versus Paint

Touchpanel screens use Red, Green, and Blue as their primary colors. The screen emits light made up of thousands of tiny red, green, and blue pixels that are so close together you cannot easily distinguish an individual light emitter. By turning these lights on and off, the illusion of mixed colors is reproduced. In the case of a touchpanel, black is the absence of all light (all light emitters off) and white is the presence of all light (all red, green and blue light emitters on full).

The painter's palette operates on a different principle. The white surface of a paper or canvas reflects all available light and appears white. Adding colors to the white background decreases the amount of light by absorbing specific frequencies of light. For example, red absorbs the green and blue light. What we see is the light reflected from the surface to our eyes. For paints, the absence of all paint is the white surface, and the presence of all colors is black, absorbing all light.

It is important to keep in mind that when you are designing a touchpanel, you are painting the surface with light.

Color Properties

A color is described using three properties: color name, degree of saturation, and its value or lightness. For example, pink, fire engine red, and brick are all in the red color family, they differ because of their saturation and intensity.

Hue, intensity, saturation and luminance/value are inter-related terms and have to do with the description of a color. Hue is the term for the pure spectrum colors that are usually referred to by name - red, orange, yellow, blue, green and violet.

Value (or luminance) is the lightness or darkness of a color. The value is a function of shade and tint.

Shade is a hue produced by the addition of black.

Tint is a hue produced by the addition of white.

The **saturation** of a color describes color intensity or purity. A pure hue has the highest saturation of color.

Color Perception

Warm colors (reds, and yellows) appear to be in front of cool colors (blues and violets). The warm colors seem to advance or be on top of or in front of the receding cool colors. In addition, there are other psychological components to color.

Red is the color of fire and blood, so it is associated with energy, war, danger, strength, power, determination as well as passion, desire, and love. Red is a very emotionally intense color. Red brings text and images to the foreground. Use it as an accent color to stimulate people to make quick decisions. Red is widely used to indicate danger.

Orange combines the energy of red and the happiness of yellow. It is associated with joy, sunshine, and the tropics. Orange represents enthusiasm, fascination, happiness, creativity, determination, attraction, success, encouragement, and stimulation. To the human eye, orange is a very hot color, so it gives the sensation of heat. Nevertheless, orange is not as aggressive as red. Orange has very high visibility, so you can use it to catch attention and highlight the most important elements of your design.

Yellow is the color of sunshine. It's associated with joy, happiness, intellect, and energy. Yellow produces a warming effect, arouses cheerfulness, stimulates mental activity, and generates muscle energy. Yellow is often associated with food. Bright, pure yellow is an attention getter, which is the reason taxicabs are painted this color. Yellow is seen before other colors when placed against black; this combination is often

used to issue a warning. Yellow is very effective for attracting attention, so use it to highlight the most important elements of your design. Light yellow tends to disappear into white, so it usually needs a dark color to highlight it. Shades of yellow are visually unappealing because they loose cheerfulness and become dingy.

Green is the color of nature. It symbolizes growth, harmony, freshness, and fertility. Green has strong emotional correspondence with safety. Dark green is also commonly associated with money. Green has great healing power. It is the most restful color for the human eye; it can improve vision. Green suggests stability and endurance. Green, as opposed to red, means safety.

Blue is the color of the sky and sea. It is often associated with depth and stability. It symbolizes trust, loyalty, wisdom, confidence, intelligence, faith, truth, and heaven. Blue is considered beneficial to the mind and body. It slows human metabolism and produces a calming effect. Blue is strongly associated with tranquility and calmness. As opposed to emotionally warm colors like red, orange, and yellow; blue is linked to consciousness and intellect. When used together with warm colors like yellow or red, blue can create high-impact, vibrant designs.

Purple (violet) combines the stability of blue and the energy of red. Purple is associated with royalty. It symbolizes power, nobility, luxury, and ambition. It conveys wealth and extravagance. Purple is associated with wisdom, dignity, independence, creativity, mystery, and magic.

White is associated with light, goodness, innocence, purity, and virginity. It is considered to be the color of perfection. White means safety, purity, and cleanliness. As opposed to black, white usually has a positive connotation.

Black is associated with power, elegance, formality, death, evil, and mystery. Black is a mysterious color associated with fear and the unknown. It usually has a negative connotation (blacklist, black humor, 'black death'). Black denotes strength and authority; it is considered to be a very formal, elegant, and prestigious color (black tie, black Mercedes). Black gives the feeling of perspective and depth, but a black background diminishes readability. Black contrasts well with bright colors. Combined with red or orange – other very powerful colors – black gives a very aggressive color scheme.

Color Harmony

Harmony is a set of colors that are pleasing to the eye, creating a sense of order and balance. The visual task of screen design requires a logical structure. Color harmony delivers visual interest, a sense of order, and creates a dynamic visual equilibrium. Inharmonious color schemes are either dull or confused. At these extremes of bad design are a bland uninteresting display or an overdone, chaotic display that repulses the viewer.

Formulas for Color Harmony

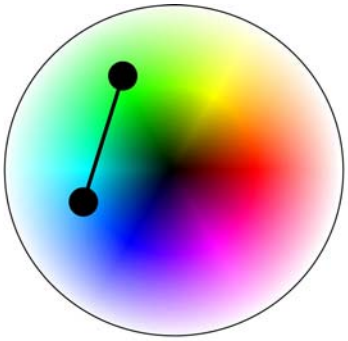
Monochromatic harmony uses variations in lightness and saturation of a single color. This scheme looks clean and elegant. Monochromatic colors go well together, producing a soothing effect. The monochromatic scheme is very easy on the eyes, especially when using blue or green hues.

Analogous harmony uses colors that are adjacent to each other on the color wheel.

One color is used as a dominant color while others are used to enrich the scheme. The analogous scheme is similar to the monochromatic, but offers more possibilities.

Avoid using too many hues and avoid combining warm and cool colors in this scheme.

Analogous Colors

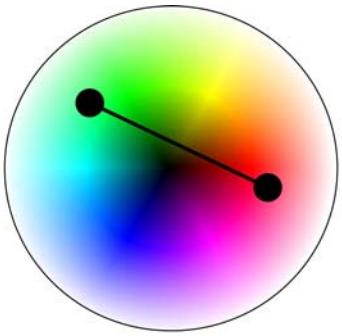


Complementary harmony consists of two colors that are opposite each other on the color wheel.

This scheme looks best when you place a warm color against a cool color, for example, red against green-blue. This scheme is intrinsically high-contrast. For best results, place cool colors against warm ones, for example, blue versus orange. If you use a warm color (red or yellow) as an accent, you can reduce the saturation the opposite cool colors to put more emphasis on the warm colors. When choosing complementary colors, fully saturated colors will offer the highest level of contrast. Choosing from tints or shades within the hue family reduces the overall contrast of the composition.

Avoid using browns or dull yellows.

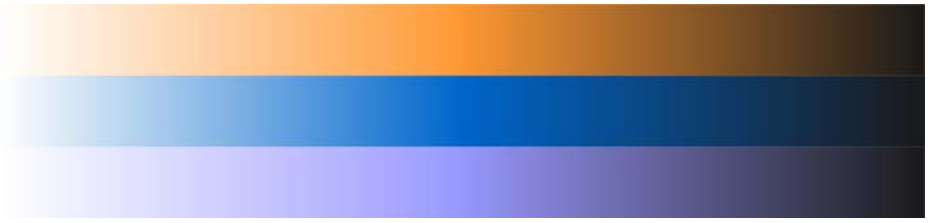
Complimentary Colors

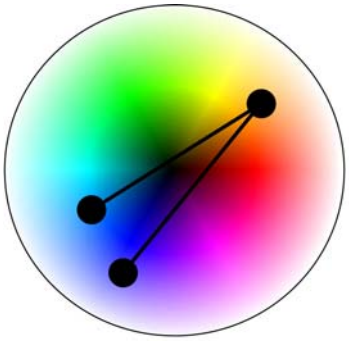


Split Complementary harmony is a variation of the standard complementary scheme. It uses a color and the two colors adjacent to its complementary.

This provides high contrast without the strong tension of the complementary scheme. Use a single warm color against a range of cool colors to put an emphasis on the warm color (red versus blues and blue-greens, or orange versus blues and blue-violets.

Split Complimentary Colors

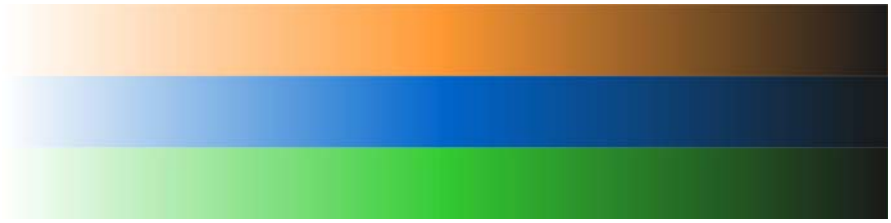


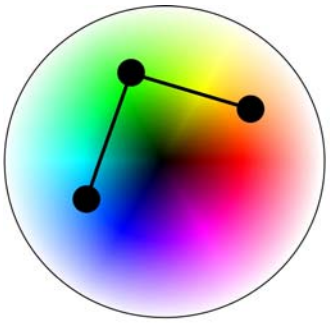


Equilateral harmony uses three colors equally spaced around the color wheel.

This scheme offers strong visual contrast while retaining harmony and color richness. The triadic scheme is not as contrasting as the complementary scheme, but it looks more balanced and harmonious. Choose one color to be used in larger amounts than others.

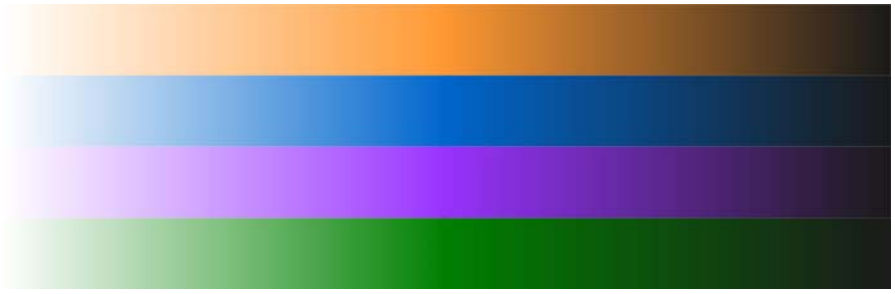
Equilateral Colors

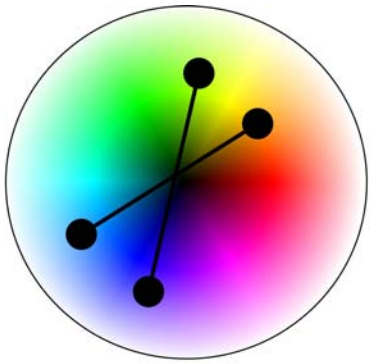




Double Complementary harmony is the most varied because it uses two complementary color pairs. This scheme can be difficult to harmonize if all four hues are used in equal amounts. If the scheme looks unbalanced, choose a color to be dominant and/or subdue (adjust the luminance) of the colors. Avoid using pure colors in equal amounts.

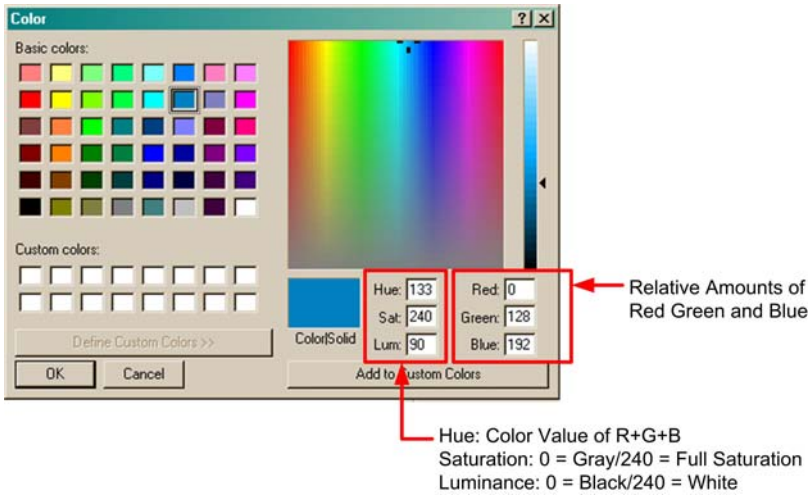
Double Complimentary Colors





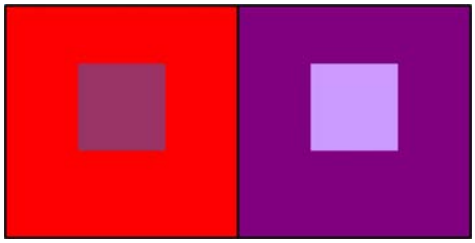
Specifying Colors

Color properties are specified by a set of associated number values.



Color Relativity and Readability

Observing the effects colors have on each other is the starting point for understanding the relativity of color. The relationship of values, saturations and the warmth or coolness of respective hues can cause noticeable differences in our perception of color. The purple square on the left seems to recede, while the one on the right seems to advance. In addition, the one on the left appears larger (they are the same size).



NOTE: If large areas of a light hue are used, the whole screen will appear light; conversely, if large areas of dark values are used, the whole screen appears dark.

When fully saturated complements are brought together, interesting effects are noticeable such as vibrating boundaries. This may be a desirable illusion, or a problem if creating visuals that are to be read. An occurrence known as simultaneous contrast (chromostereopsis) happens when opposing colors are placed in close proximity. Text may appear to vibrate, or cast a shadow.

When creating visuals that are designed for reading, the viewer must have adequate contrast between the background and the text. Text presentations ideally offer at least an 80% contrast between figure and ground (black text on a white background is ideal). When there is not enough contrast between figure and ground, the viewer must squint to read the text, causing eye fatigue. Yellow text on a white background or blue text on a black background, are difficult to read due to the low level of contrast between figure and ground.

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876]. For assistance in your local time zone, refer to the Crestron website (www.crestron.com) for a listing of Crestron worldwide offices.

You can also log onto the online help section of the Crestron website to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

INDEX

Additional Required Information 6
Analogous harmony 65
Animation 54
Background Images 2
Borders 55
Buttons 50
C2N-CB Series Cameo Keypads Description 40
Clock 52
Color Harmony 64
Color Perception 63
Color Properties 63
Color Relativity and Readability 68
Color Theory 62
Complementary harmony 65
Control System Block Diagrams 39
Double Complementary harmony 67
Equilateral harmony 66
FORM A – Device Data 7
FORM B – Interface Specification 9
FORM C – System Routing 11
Form D – CT-1000 ColorTouch™ 3.8-inch Wall Mount Touchpanel 13
Form D – Touchpanel Specifications and Drawings 12
Form D – TPMC-10 Isys i/O™ WiFi Touchpanel 14
Form D – TPMC-15 Isys i/O™ WiFi Touchpanel Media Center 15
Form D – TPMC-17 Isys i/O™ WiFi Touchpanel Media Center 17
Form D – TPS-12 Isys® 12-inch Touchpanel 19, 20
Form D – TPS-15 Isys® 15-inch Touchpanel 21, 22
Form D – TPS-17 Isys® 17-inch Touchpanel 23, 24
Form D – TPS-1700 Isys® 6-inch Touchpanel 25
Form D – TPS-2000L Isys® 5" Wall Mount Touchpanel 28
Form D – TPS-3000/3100L Isys® 6.4-inch Touchpanel 29
Form D – TPS-4000/4000L Isys® 10.4-inch Touchpanel 31, 32
Form D – TPS-4500 Isys® 12-inchTilt Touchpanel 33
Form D – TPS-4L Isys® 4-inch Wall Mount Touchpanel 35
Form D – TPS-5000 Isys® 12-inch Touchpanel 36
Form D – TPS-6000 Isys® 15-inch Touchpanel 37
Form E – C2N-CB Series Cameo Keypad Specification 41
Form E – C2N-DB6/8/12 Decorator Keypad Specifications 42
Form E – C2N-DBN12 & C2N-DBF12 Decorator Keypad Specifications 43
Form E, Button Panel Specifications 40
Formulas for Color Harmony 64
Gauges 52
Image 54
Introduction i
Legends 54
Lighting Control Interface 45
Lighting Control Programming Request – CT-1000 Touchpanels 48
Lighting Control Programming Request - iLux 47
Lines 55
Project Planning 6
RGB Video Objects 53
Sliders 51
Sound 2
Specifying Colors 67
Split Complementary harmony 66
Text Box 53
Timers 55
Touchpanel Objects 50
Video Objects 53
Web Anchor 56
Web Dial 56
Web Map 56
Web Marquee 56
Web Objects 56
XPanel Projects 56

Crestron Electronics, Inc.
15 Volvo Drive Rockleigh, NJ 07647
Tel: 888.CRESTRON
Fax: 201.767.7576
www.crestron.com

DOC. 5277E

01.06
Specifications subject to
change without notice.